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ABSTRACT

This guide contains eight learning modules which are designed as samples which fuse the career development concepts, subject matter, and occupational information into learning activities using occupations as the nucleus. There is one module for each of the eight occupational areas: agricultural equipment and mechanics, agricultural products (food processing), ornamental horticulture, agricultural production, agricultural supplies and services, renewable natural resources, forestry, and environmental protection. Each module includes instructional information, occupational information, pupil performance objectives, instructional activities, evaluation, and resources. (Author)

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CAREER EXPLORATION

IN

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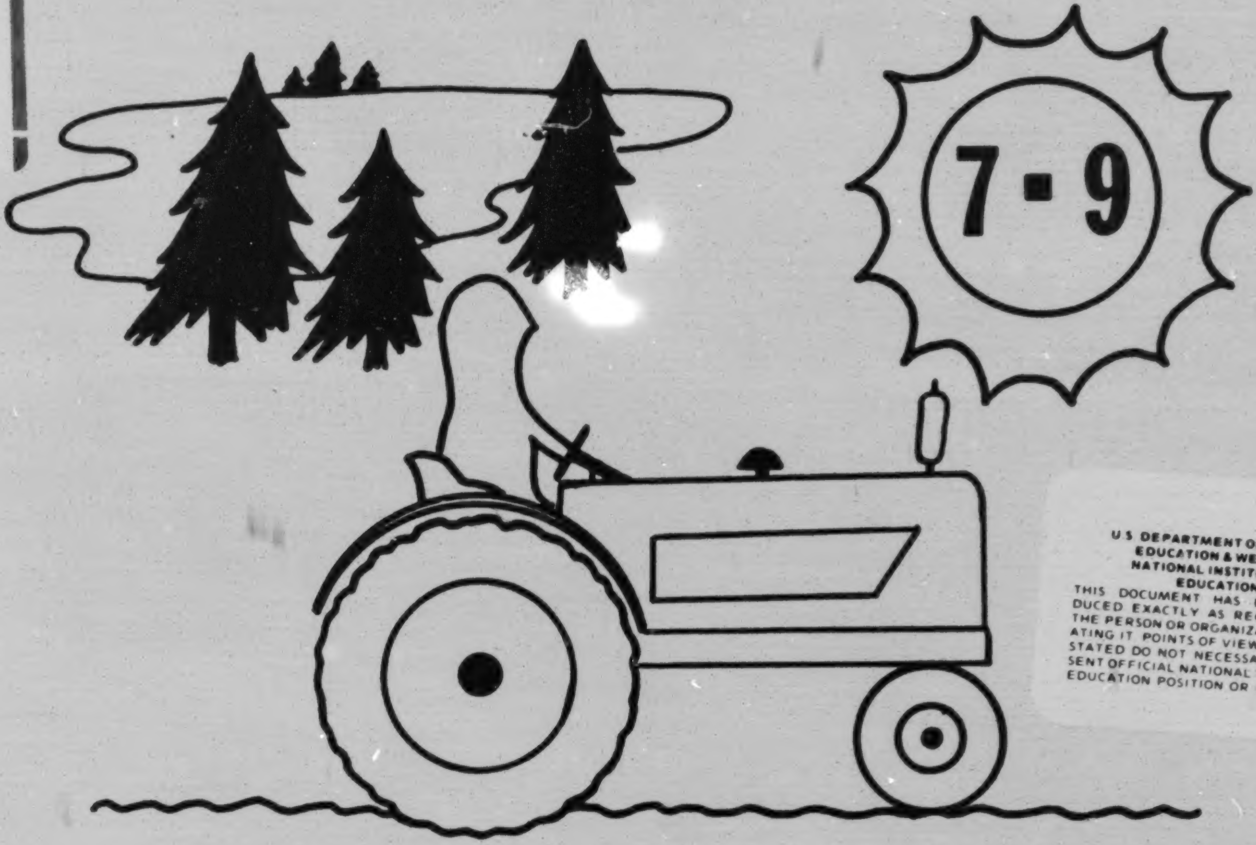
AGRIBUSINESS, RENEWABLE NATURAL RESOURCES, AND ENVIRONMENTAL PROTECTION:

A CURRICULUM GUIDE FOR GRADES 7-9



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OTHER CURRICULUM MATERIALS DEVELOPED BY THIS PROJECT INCLUDE

CAREER AWARENESS IN AGRIBUSINESS, RENEWABLE NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION: A CURRICULUM GUIDE FOR GRADES K-6.

CAREER PREPARATION IN AGRICULTURAL PRODUCTION: A CURRICULUM GUIDE FOR HIGH SCHOOL VOCATIONAL AGRICULTURE.

CAREER PREPARATION IN AGRICULTURAL SUPPLIES AND SERVICES: A CURRICULUM GUIDE FOR HIGH SCHOOL VOCATIONAL AGRICULTURE.

CAREER PREPARATION IN AGRICULTURAL EQUIPMENT AND MECHANICS: A CURRICULUM GUIDE FOR HIGH SCHOOL VOCATIONAL AGRICULTURE.

CAREER PREPARATION IN AGRICULTURAL PRODUCTS (FOOD PROCESSING): A CURRICULUM GUIDE FOR HIGH SCHOOL VOCATIONAL AGRICULTURE.

CAREER PREPARATION IN AGRICULTURAL RESOURCES: A CURRICULUM GUIDE FOR HIGH SCHOOL VOCATIONAL AGRICULTURE.

CAREER PREPARATION IN FORESTRY: A CURRICULUM GUIDE FOR HIGH SCHOOL VOCATIONAL AGRICULTURE.

CAREER PREPARATION IN ENVIRONMENTAL PROTECTION: A CURRICULUM GUIDE FOR HIGH SCHOOL VOCATIONAL AGRICULTURE.

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CAREER EXPLORATION IN AGRIBUSINESS, RENEWABLE NATURAL RESOURCES, AND ENVIRONMENTAL PROTECTION

A CURRICULUM GUIDE FOR GRADES 7-9

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OVERVIEW

In June, 1973, the Center for Educational Studies, School of Education, Eastern Illinois University, Charleston, Illinois, was awarded a twelve-month subcontract from the Ohio Career Education and Curriculum Management Laboratory in Agricultural Education, The Ohio State University, Columbus, Ohio. The prime contract came from the Curriculum Center for Occupational and Adult Education Bureau of Adult, Vocational and Technical Education, the United States Office of Education.

The purpose of this subcontract was

1. To DEVELOP two career education curriculum guides in the areas of Agribusiness, Renewable Natural Resources, and Environmental Protection.
    a. One for the CAREER AWARENESS STAGE (K-6)
    b. One for the CAREER EXPLORATION STAGE (7-9)
2. To EVALUATE the guides by field testing.

These curriculum guides were prepared to create an awareness of agricultural occupations as well as to develop career development concepts. They are a part of a comprehensive project to develop ten articulated curriculum guides -- one K-6 guide on the career awareness level, one 7-9 guide for the career exploration level, and eight 10-12 guides on the preparation level. With the assistance of Mr. Roger Roediger, the prime contract director, the agricultural concepts and occupations were selected and developed for these guides. Dr. Marla Peterson, director of the Enrichment of Teacher and Counselor Competencies in Career Education Project at Eastern Illinois University, and consultant to this project, provided the Career Development Concepts which were developed in each module.

Dr. Charles Joley, of the Center of Educational Studies, Eastern Illinois University, Charleston, Illinois, served as on-site monitor and the late Dr. Philip Teske of The United States Office of Education served as monitor from that office.

The staff and consultants of this Career Education Curriculum Development Project worked very diligently to fuse the agricultural occupational information and the career development concepts with suitable grade level subject matter so that a module of learning experiences would emerge which should not only broaden the child's occupational horizons, but also further his career development.

Dorothy Lawson
Project Director

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CAREER EDUCATION -- THE STEP BEYOND

A basic purpose of American education is the preparation of people for living and, within that context, preparation of people for a career. Career Education is the development of attitudes and appreciations toward workers and the benefits each worker receives and gives as a contributing member of society. Career Education can be the focal point for developing an educational awareness of the use of skills and knowledge taught in the schools and used by adults in the working world. Career Education can be the center of the curriculum which joins school, family, and community into a joint effort of educating the young. Career Education is concerned with the total development of a student. This means providing experiences for students to conceptualize the career development concepts which should be introduced to preschoolers and developed through high school.

Career development, which is a lifelong process, begins at a very early age when the child role plays various occupations in his play. He begins very early to establish his view of work and a view of himself as a worker. Career development proceeds much the same way as emotional, social, intellectual and physical development progress. Before one is ready for the next level, certain concepts must be conceptualized. The child goes through the following stages. The AWARENESS STAGE, which covers the preschool period through grade six, is a period when the child not only becomes aware of himself and other people physically, emotionally, and socially, but he also gains intellectual skills and knowledge. While in this stage, the child becomes interested in what adults do. He is interested in knowing how he gets the goods and services which he enjoys. He also enjoys "putting on occupational roles" by role playing the many occupations with which he has become acquainted. The EXPLORATION STAGE, which usually covers the middle or junior high school age level, is a time for some actual exploring of a variety of occupations. It is a time of self-assessment and of consideration of the various types of careers available to the individual. The student should, by this time, be able to identify who he is and what his interests and abilities are, to make decisions and be prepared to adjust and change those decisions, to formulate some preferences for particular occupations, and to identify various lifestyles he may wish to pursue. A tentative decision may be made by grade nine in order to begin the PREPARATION STAGE. This stage will last as long as necessary for the acquisition of skills and knowledge needed to enter and progress through one's occupational career.

The student has difficulty in making a critical career choice when he has not been provided visible "world of work" experiences, has not been involved in the decision-making process, or has not participated in any work experiences associated with his career choice.

Career Education, then, is the education of the child of today in a manner which will make his life useful and productive in the world he will live in tomorrow. It is preparing the future adult to develop the philosophy that work has value and meaning to the individual and to society. It provides an exposure to a wide variety of possible careers so that the young adult can make a career choice on the basis of his self-knowledge, his particular needs, abilities, interests, and the needs of society.

LOCAL PROGRAM DEVELOPMENT AND IMPLEMENTATION

In order to implement an organized and efficient Career Education program, a great deal of preplanning is needed. This includes establishing guide lines for the development of each segment of the program.

Career Education needs to be introduced as a program of High Priority for the whole educational system. As such, individual time and interest is given more freely, and the program is given the emphasis needed.

An understanding of the career development concepts and objectives need to be developed for all persons involved in the program planning and implementation. It is important to conduct a local resource study and then make a usable compilation of that data. This resource file should include human resources, as well as printed and audio-video materials, and locations of places available for career education field trips.

The organizing of committees of interested individuals, which should include educators, parents, employers, representatives from public agencies, and elected government officials, is appropriate. The established educational system should be studied and notations made where changes could be made to incorporate the career development concepts and the occupational information. Consideration should be given to the purpose and function of the existing programs and courses.

Objectives should be written for both the teacher and pupil. The curriculum should be planned for the articulation of Career Education throughout the entire K-12 school. In-service training programs need to be designed with adequate time provided for teacher-planning of individual programs. Plans need to be made to implement a pilot program and then, through evaluation, changes can be made for the permanent implementation in the entire school district curriculum. Once the program is ready to be implemented into the system, the classroom teacher plans how she will fit the program into her individual program.

Some ways to implement a program into the classroom are listed here only as alternatives for putting career education into the classroom. Following each method is one consideration which should be dealt with when selecting that particular implementation plan.

1. The career development concepts can be infused into all other subjects. Consideration: The career development concepts would need to be classified as to which ones would be taught in each subject so that all concepts would be developed.

2. All subject matter concepts can be fed into each career development activity. Consideration: Subject matter concepts need to be determined which best fuse with each career development concept.

3. Career education becomes a separate subject. Consideration: The career development concepts are isolated from other educational activities.

4. Career development concepts can be selected to be taught in only certain subject areas such as social studies or language arts. Consideration: The only occupations identified may be those primarily oriented toward one subject, and some concepts can be developed better in other subject matter areas.

5. The nonintegrated plan uses the career development concept whenever and wherever convenient during the school year. Consideration: A thorough command of all career development concepts is needed in order to make use of the teachable moment.

6. Occupational information is the focus of career education activities. Consideration: Career development concepts may be neglected, and educational awareness may not be made apparent.

7. Career development concepts become the central force of the curriculum. All other subjects are fused with career development concepts and all other subject concepts. Consideration: Activities may not include occupational information or experiences.

8. Career development concepts, fused with subject matter, can be taught by using a specific occupation as the organizing force. Consideration: It is possible to provide more educational awareness, community awareness, and awareness of self when the child is exposed to real people in the "world of work."

The modules developed for this curriculum guide have been designed to follow method 8 since it is essential that educational experiences be given each child to aid in his self-development as a potential member of the "world of work."

The following pages provide an articulation plan for providing occupational and career development experiences for K-9 pupils. The K-6 curriculum guide modules were based on student interest in the occupation and on the career development concept which best fit the experiences which could be developed. One primary module and one intermediate module were developed in each of the Agricultural Areas. Each of the 7-9 curriculum guide modules was designed around one of the Agricultural Areas and one major Career Development Concept. The sub-area modules were designed to be used as individualized student activities.

The 10-12 curriculum guides provide the basis for developing vocational courses in each of the major Agribusiness, Renewable Natural Resources, and Environmental Protection areas. All of the curriculum guides developed in this particular project are listed on the inside cover of this curriculum guide. The articulation plan used to present this particular cluster of occupations to the K-12 pupils is important to note at this point. The curriculum developers have articulated the K-12 guides in such a manner that each guide builds upon or enlarges the experiences provided in preceding guides; i.e., the K-6 guide provides an awareness of this cluster of occupations, the 7-9 provides exploration experiences pertaining to this occupational cluster, and the 10-12 guides provide experiences at the preparation level for the acquisition of job entry skills required in this occupational cluster.

K-6 CAREER DEVELOPMENT INFUSED MODULES

CAREER DEVELOPMENT CONCEPTS	PRIMARY GRADE LEVEL				INTERMEDIATE GRADE LEVEL		
	K	1	2	3	4	5	6
COPING BEHAVIOR #1				FOREST TECHNICIAN			FEED SALES PERSONNEL
COPING BEHAVIOR #2		PARK RANGER NATURALIST			CHRISTMAS TREE FARMER		
LIFESTYLE	PEANUT BUTTER MAKER					IRRIGATION ENGINEER	
SELF-DEVELOPMENT #1	ENVIRONMENTAL INSPECTOR				ENVIRONMENTAL TECHNICIAN (noise)		
SELF-DEVELOPMENT #2		AGRONOMIST					DAIRY PROCESSING EQUIPMENT OPERATOR (cheese)
SELF-DEVELOPMENT #3				FARM EQUIPMENT MECHANIC			FISH CULTURIST
DECISION MAKING #1			FLORIST			LIVESTOCK PRODUCER	
DECISION MAKING #2			TRUCK FARMER			GREENSKEEPER	

I. Agricultural Production
  A. Truck Farmer
  B. Livestock Producer

II. Agricultural Supplies and Services
  A. Agronomist
  B. Feed Sales Personnel

III. Agricultural Equipment and Mechanics
  A. Farm Equipment Mechanic
  B. Irrigation Engineer

IV. Agricultural Products (Food Processing)
  A. Peanut Butter Maker
  B. Dairy Processing Equipment Operator (cheese)

V. Ornamental Horticulture
  A. Florist
  B. Greenskeeper

VI. Renewable Natural Resources
  A. Park Ranger Naturalist
  B. Fish Culturist

VII. Forestry
  A. Forest Technician
  B. Christmas Tree Farmer

VIII. Environmental Protection
  A. Environmental Inspector
  B. Environmental Technician (noise)

7-9 CAREER DEVELOPMENT INFUSED MODULES

CAREER DEVELOPMENT CONCEPTS	OCCUPATIONAL SUB-AREA MODULES							AREA
DECISION MAKING #1	Animal Production	Plant Production	Mechanics	Agricultural Business Management				AGRICULTURAL PRODUCTION
COPING BEHAVIORS #2	Feeds	Chemicals	Fertilizers	Seeds				AGRICULTURAL SUPPLIES AND SERVICES
SELF-DEVELOPMENT #2	Power, Machinery, and Tools	Agricultural Structures	Soil and Water Management	Electrification				AGRICULTURAL EQUIPMENT AND MECHANICS
COPING BEHAVIORS #1	Dairy Processing	Meat Processing	Fruit, Vegetables, and Nuts	Other Products				AGRICULTURAL PRODUCTS (FOOD PROCESSING)
SELF-DEVELOPMENT #1	Arboriculture	Floriculture	Green House Operation & Management	Landscaping	Nursery Operation & Management	Turf Management		ORNAMENTAL HORTICULTURE
LIFESTYLE	Forests	Soil	Wildlife	Water	Fish	Range	Recreational Uses	RENEWABLE NATURAL RESOURCES
SELF-DEVELOPMENT #3	Production & Propagation	Protection	Products & By-Products					FORESTRY
DECISION MAKING #2	Water	Air, Noise, Radiation	Solid Wastes					ENVIRONMENTAL PROTECTION

PURPOSE AND USE OF THIS GUIDE

This guide is intended to be used as a model to develop Career Education experiences in a classroom program. The emphasis of the materials is not only to provide occupational information or provide for the development of attitudes and appreciations, but to provide experiences for using cognitive and psychomotor skills and knowledge in a career development program. This guide has three major goals:

1. Provide a guide for developing a career education curriculum using the *AGRIBUSINESS, RENEWABLE NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION* cluster.
2. Provide sample modules for each grade level which show the fusion of *CAREER DEVELOPMENT CONCEPTS*, *SUBJECT MATTER*, and *OCCUPATIONAL INFORMATION*.
3. Provide an example for developing awareness or exploration experiences of Agribusiness, Renewable Natural Resources and Environmental Protection occupations.

Because state supervisors, school district curriculum committees, and classroom teachers will be involved in the development of career education curriculums, it was determined that the format used for this curriculum guide should be transportable by those program developers into the state or local level programs. Included in this guide are seven aids which should help in the development of any career education curriculum:

1. A listing of the *CAREER DEVELOPMENT CONCEPTS* is given so that the instructors will know the concepts which are to be developed at a certain stage as well as those preceding and following them. All of the subconcepts are being aimed toward major concepts. These concepts are separated into two dimensions: Developmental and Interacting. Coping Behaviors, Self-Development, Decision Making, and Lifestyle concepts are considered developmental as they can be sequenced into a logical progression for different experience levels. Career Information, Educational Awareness, Attitudes and Appreciations for all levels plus Economic Awareness and Skill Awareness on the junior high school level are considered Interacting Dimensions because these concepts are those which are appropriate for any level.
2. A listing of *GRADE LEVEL SUBJECT MATTER* in the areas of Mathematics, Social Studies, Language Arts and Science identifies those topics used in this guide. This subject matter is used in the development of activities for a particular grade level. Since the learning modules are designed to develop an awareness or exploration of occupations and to develop career concepts, the activities provide reinforcement and extension of skills and knowledge as taught in the elementary or junior high school and as used for occupational competencies.

3. The listing of *OCCUPATIONAL CLUSTER DEFINITIONS, AREAS FOR INVESTIGATION AND OCCUPATIONS* in this cluster is provided to give some broad definitions of the topic to be presented, the kinds of knowledge used by workers in this area, and the various occupations which are classified within this category.

4. The *EXPERIENCE LEVEL, LEARNING MODULE AND CAREER DEVELOPMENT CONCEPT MATRIX* shows the placement of that particular learning module. For example: The FLORIST is written around a decision-making subconcept for children at second experience developmental level. However, it is not necessarily designed to be taught only to second graders. Because of the provision of individual instruction for the child on his level, the learning module may be used above or below the grade level in which it has been placed. This decision is entirely within the prerogative of the local curriculum committee and/or teacher.

5. A suggested *ARTICULATION OF A CAREER AWARENESS PROGRAM IN THE AREAS OF AGRIBUSINESS, RENEWABLE NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION* is given so that curriculum planners will have an overall view of the many possible occupations which could be included in their program and the grade level in which the occupations could be related to subject matter already being taught.

6. The *LEARNING MODULES* are designed as samples which fuse the career development concepts, subject matter, and occupational information into activities using occupations as the nucleus.

   The modules in these guides deal with the affective domain, the cognitive domain, and the psychomotor skills and knowledge developed from kindergarten through the middle or junior high school. Each child can, on his own level, understand how a worker in agriculture affects his life, and he can gain an appreciation of that person's contribution to the well-being of society. The child is also developing the basic cognitive skills and knowledge which are further developed by adults for competency in their occupation. Most of the psychomotor skills perfected by adults had their basic beginnings in the young child. Therefore, with the providing of experiences for a child at his level, he can gain an understanding of the world of work and begin to view himself as a part of that world. As the child develops and gains experiences which he relates to himself, he will be better prepared to make a wiser career choice.

   In order to help the teacher become aware of *CAREER DEVELOPMENT CONCEPTS* which can be developed through the activities, the concept has been printed directly opposite each activity. A teacher, therefore, planning additional activities for his own individual program should plan to emphasize a career development concept within each activity. In order to insure educational awareness of the application of skills and knowledge taught in the school, emphasis should be given throughout the module on the skills used by persons in the world of work.

3/4

Each module has three basic parts: instructional information, instructional activities, and culmination or evaluation activities. The instructional information contains the career development concepts which are developed for that module, the subject matter which is needed to carry through the activities, occupational information (in some cases for the teacher only and in others for the students), and pupil performance objectives aimed primarily at the career development concepts. The instructional activities for the elementary grades are teacher-directed and are a controlled means of developing the career development concepts. For the junior high or middle school, these teacher-directed activities lead the student into individual or small group activities which are designed to give the student a few "hands-on" experiences with the kind of work encountered in an occupational area of his choice. The culmination or evaluation activities are suggested ways of measuring the objectives set for each module. Because the classroom teacher is the best qualified evaluator in her classroom, she should decide HOW a given knowledge or skill shall be demonstrated and the QUALITY and QUANTITY of knowledge or skill required for a particular child or group of children.

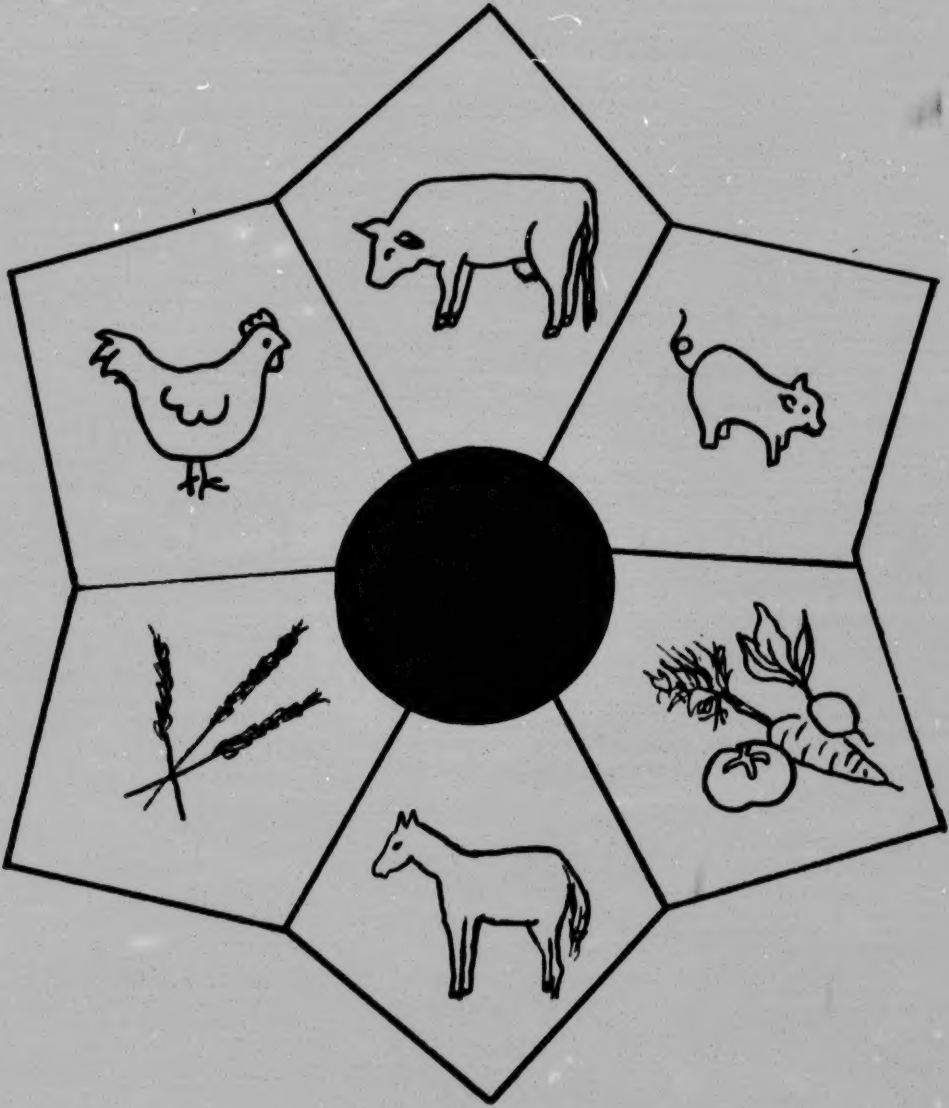
7. *LEARNING RESOURCES* are listed at the end of the modules. This listing is not an endorsement. In fact, not all materials listed have been reviewed in detail. The criterion for selection is the material's appropriateness to the module.

5/6

LEARNING MODULES

MAJOR CAREER DEVELOPMENT DIMENSION

DECISION MAKING



AGRICULTURAL PRODUCTION

ANIMAL PRODUCTION PLANT PRODUCTION

AGRICULTURAL BUSINESS MANAGEMENT

BEFORE YOU BEGIN

For the convenience of both teacher and student, the materials in this study are divided into three sections. The last of these -- STUDENT ACTIVITIES -- is actually part of the second; it is presented as one piece, however, so that the teacher can easily lift it out, duplicate it, and distribute it to the class.

I. INSTRUCTIONAL INFORMATION

CAREER DEVELOPMENT CONCEPTS. These are the main concepts to be developed in this unit. The teacher should concentrate especially on the DECISION MAKING subconcept *previous decisions, peers, gratifications, needs, interests, and career information influence present and future decisions*. This particular concept is selected for development in this unit because effects of decisions can be shown very graphically as the students work with these materials. The other five interacting subconcepts further develop other understandings necessary for making career decisions.

INFUSED SUBJECT MATTER. This is a listing of some of the knowledge and skills acquired by this level of education. The subject matter is used in carrying out the student activities.

OCCUPATIONAL INFORMATION. For the benefit of the teacher, the several occupational areas with which the students are working in section three are also outlined here. Specific occupations in each of these areas are listed in the student section.

PUPIL PERFORMANCE OBJECTIVES. The teacher should consider these as the outcomes expected for the students by the end of the unit.

II. INSTRUCTIONAL ACTIVITIES

INTRODUCTORY ACTIVITIES. These are designed to interest the students in the subject matter of this unit, as well as to provide a controlled means of developing the career development concepts. The last of these activities should lead directly into . . .

INDIVIDUAL AND SMALL GROUP ACTIVITIES. On the basis of the last INTRODUCTORY ACTIVITY, the teacher should group the students into each occupational area and distribute to each group the information and activities for its chosen area. (See Section III below.) Students in each group can then choose which specific activities they would like to do. These activities are meant to give the student a few "hands-on" experiences with the kind of work encountered in the AGRICULTURAL PRODUCTION occupations. The teacher is free to develop additional activities which could add to the student's understanding of this unit.

CULMINATION ACTIVITIES. After each individual or small group has completed its activity, the students should be given a chance to

share their information. They may want to present their displays, give their reports, or exchange their career packets for a few days. The teacher should also use the CULMINATION ACTIVITIES suggested.

EVALUATION ACTIVITIES. Some evaluation experiences are provided for the unit. Rather than prescribe formal testing, the materials give a suggestion for evaluating the career development concepts. Because the classroom teacher is the best qualified evaluator in her classroom, she should decide HOW a given knowledge or skill shall be demonstrated and the QUALITY and QUANTITY of knowledge or skill required for a particular child or group of children.

III. STUDENT ACTIVITIES. These activities are to be used by each group and are in the preceding section.

The numbers listed to the right of each occupation are taken from The Dictionary of Occupational Titles (D.O.T.), Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

I. INSTRUCTIONAL INFORMATION

CAREER DEVELOPMENT CONCEPTS

DECISION MAKING

Major Concept	Life involves a series of choices leading to career commitments.
Subconcept	*Previous decisions, peers, gratifications, needs, interests, and career information influence present and future decisions.*

CAREER INFORMATION

Major Concept	Basic career information will aid in making career-related decisions.
Subconcept	*Career development includes progression through stages of educational and occupational training.*

EDUCATIONAL AWARENESS

Major Concept	Educational skills and experiences are related to the achievement of career goals.
Subconcept	*Career-oriented learning may take place in or out of school.*

ATTITUDES AND APPRECIATIONS

Major Concept	Society is dependent upon the productive work of individuals.
Subconcept	*Specialized occupations result in an interdependent society.*

ECONOMIC AWARENESS

Major Concept	Basic economic understanding will aid in making career-related decisions.
Subconcept	*Additional training and experience increases earning potential.*

SKILL AWARENESS

Major Concept	All occupations require general and specific skills.
Subconcept	*Career plans should be designed and executed with the understanding that evaluation and replanning may be necessary.*

INFUSED SUBJECT MATTER

Mathematics
1. Profit-loss statements
2. Percents
3. Graphs
4. Fractions
5. Decimal system

Language Arts
1. Reading current articles
2. Public speaking
3. Report writing
4. Role playing
5. Interviewing

Science
1. Chemical reactions
2. Research
3. Environmental protection
4. Genetics
5. Classifications

Social Studies
1. Maps
2. Sociology (interdependent society)

OCCUPATIONAL INFORMATION

Agricultural Production

Agricultural production is the growing of crops or raising of livestock for the purpose of increasing the quantity of quality products and offering those crops, livestock, or products for sale. High agricultural production requires people with a high degree of knowledge and skill in the plant or animal sciences, and/or business management.

Animal Production: The principal activities deal with the quantity production of quality food and non-food needs for humans and other animals, as well as with the improvement of production practices by better breeding, feeding, and management techniques.

Plant Production: The principal activities deal with the quantity production of quality food and non-food needs for humans and other animals, as well as with the improvement of production practices by better seed selection; fertilizing programs; and planting, cultivating, and harvesting techniques.

Mechanics: The principal activities deal with the purchasing, operating, and maintaining of general and specialized equipment. (This area will be developed in the module entitled "Agricultural Mechanics.")

Agricultural Business Management: The principal activities deal with budgeting (accounting), financing, managing, marketing, purchasing, personnel management, and economics.

PUPIL PERFORMANCE OBJECTIVES

DECISION MAKING

. . . choose an area of interest from the area of Agricultural Production, and list the many factors which influenced this choice.

CAREER INFORMATION

. . . collect information about a career choice and determine the educational and occupational training needed.

. . . design a plan showing stages through which a student progresses from his introduction to career information through junior high, senior high, occupational experiences, training, to the attainment of a final goal.

EDUCATIONAL AWARENESS

. . . use the plan above to classify those career experiences as in-school or out-of-school learning experiences or both.

ATTITUDES AND APPRECIATIONS

. . . demonstrate the interdependence of an agricultural production career and the productive work of others.

ECONOMIC AWARENESS

. . . use a particular product of agricultural production to show a consumer's involvement in the principle of supply and demand.

. . . use the same framework to show the role of the farmer as a producer.

SKILL AWARENESS

. . . use the career plan developed under "Career Information" to identify the times when evaluation and replanning may be necessary.

II. INSTRUCTIONAL ACTIVITIES

The instructional activities have been designed to develop the CAREER DEVELOPMENT CONCEPTS using a variety of subject matter, knowledge and skills, and appropriate occupational information. The teacher may develop additional activities which could add to the student's understanding of this unit.

INTRODUCTORY ACTIVITIES	CAREER DEVELOPMENT CONCEPTS
1. List with the class some skills and knowledge needed to make an occupational choice. Have the students recall what they wanted to be at ages 4 and 10. Have them decide what career they would now like to pursue.	*Career development includes progression through stages of educational and occupational training.* Career Information
2. Have each student identify at least one occupation he has considered to be a career for himself. Have him list as many factors as he can think of which influenced his choice -- Interests? Needs? Gratifications? Peers? Adults? Career Information? Previous Decisions?	*Previous decisions, peers, gratifications, needs, interests, and career information influence present and future decisions.* Decision Making
3. Develop with the students a list of agricultural occupations which produce food or non-food products (see lists on student pages). Discuss how society is dependent on the farmer and how the farmer depends upon society.	*Specialized occupations result in an interdependent society.* Attitudes and Appreciations
4. List in class discussion educational experiences outside the classroom which are agriculturally related (i.e., 4-H club, garden club, trips to farms, pet ownership). How would these experiences affect a career choice?	*Career-oriented learning may take place in or out of school.* Educational Awareness
5. Invite someone from one agricultural production area to talk to the class about the way his career developed. Have him stress the value of additional training and experience on his earning potential, as well as what he does and the importance of his occupation to society.	*Additional training and experience increase earning potential.* Economic Awareness
6. Have the students assess themselves in the following areas because additional career information affects career choice: General: suburban or rural life, non-food and food production, operation of a business, growth of plants, and animal production.	*Previous decisions, peers, gratifications, needs, interests, and career information influence present and future decisions.* Decision Making

Specific: animal care, marketing livestock, seed and plant selection, pest control, farm planning, farm finances and law, and farm personnel management.

Use the assessment list developed in the last activity to help each student determine which of the areas listed below he would like to investigate.

SMALL GROUP OR INDIVIDUAL ACTIVITIES

See student pages: Animal Production - p. 17
Plant Production - p. 21
Agricultural Business Management - p. 23

CULMINATION ACTIVITIES

1. Have the student develop a list of subjects which are taught in elementary and junior high schools and those subjects which are offered by his high school which help prepare for an agricultural career.

Career development includes progression through stages of educational and occupational training.
Career Information

2. Ask the students to prepare a food, animal, and/or plant chart which indicates decisions made as a raw material is produced. All persons involved in the decisions should be included.

Specialized occupations result in an interdependent society.
Attitudes and Appreciations

3. Ask the class to develop a hierarchy of decision making within the framework of a farm, starting with the person who makes the most important decisions and following with those who make decisions of lesser importance. These decision makers should be related to levels of training and/or experience and earning potential.

Additional training and experience increase earning potential.
Economic Awareness

EVALUATION

All people make occupational decisions throughout their lives. Have the students list some of the major and minor decisions they have made and will need to make to accomplish their career choices. These decisions could then be traced in autobiographical form.

RESOURCES

See "References for Additional Information" page.

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III. STUDENT ACTIVITIES

AGRICULTURAL PRODUCTION

Animal Production: The principal activities deal with the quantity production of quality food and non-food needs for humans and other animals, as well as with the improvement of production practices by better breeding, feeding, and management techniques.

OCCUPATION	D.O.T.
Stock ranch foreman (cattle, sheep, swine)	413.131
Cattle producer	413.181
Sheep rancher	413.131
Farm or ranch hand	419.884
Ranch or farm manager	413.181
Wool buyer (broker - buyer)	162.158
Animal nutritionist (animal husbandry)	040.081
Veterinarian	073.108
USDA inspector	143.684
Part-time farmer	421.883
Swine farmer	413.181
Artificial inseminator	467.384
Breed association fieldman	108.118
Livestock marketing specialist (ag. economist)	050.088
Livestock buyer	162.158
Agricultural farm advisor or consultant	096.128
Animal groomer (stableman - groom)	356.874
Livestock serviceman	466.887
Veterinarian's assistant	073.381
Livestock sales organization manager	261.258
Foreign agricultural service	188.118
General farmer	421.181
Animal geneticist	041.081
Pet shop attendant	356.877
Bee keeper	419.181
Animal taxonomist (see zoologist)	041.081
Dog breeder	419.181
Poultry farm manager	412.137
Poultry farm foreman	412.137
Poultry breeder, geneticist	041.181
Poultry farm hand	412.884
Poultry salesman	261.258
Hatchery manager	412.168
Incubator operator	412.137
Poultry association fieldman	108.118
USDA inspector	413.684
Horse farm manager	419.131
Horse trainer	419.884
Horse rancher	413.181
Farrier	356.381

OCCUPATION (continued)	D.O.T.
Horse buyer or agent	162.158
Horse farm foreman	413.131
Horse extension specialist	096.168
Horseman, show	413.181
Horse breeder	413.181

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a group or individual can consider the many DECISION-MAKING aspects in an Animal Production occupation. Notes should be kept on these DECISION-MAKING opportunities for future discussion.

1. Make a complete step-by-step plan of action from breeding to marketing for a particular animal. Include a budget of income and expenses.

2. Visit a breeder or feeder in the community to observe and study his feeding or breeding and management techniques. Record the system.

3. Investigate at least three common diseases of a particular animal. Learn their causes, effects, prevention, and treatment.

4. Conduct a feeding experiment with laboratory animals, using two different rations. Record the findings. Compare costs.

5. Find out why vitamins are needed by animals. Do all need the same vitamins? Find out what minerals are necessary and why.

6. Trace the discovery of various antibiotics and their affect on animal production.

7. Prepare a chart showing the body structure of cattle, swine, and sheep and compare their digestive systems.

8. Research the importance of heredity, how it is controlled, and why it is important to a livestock producer.

9. Follow the livestock exchange for one or two weeks. What changes occurred and why? Prepare a graph to show changes.

10. Interview a person involved in animal production. Gather the following kinds of information from the interviewee and any reference materials available:

    a. Special skills and aptitudes required
    b. Educational requirements
    c. Working conditions and setting
    d. Employment possibilities
    e. Kinds of decisions made by the interviewee which led to his career choice
    f. Factors which influenced the career decisions made by the interviewee

g. Decision-making ability as a factor for promotion or increase in production

11. Design a packet of materials which could introduce other students to the occupation chosen in the area of animal production. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number ten could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered and to give additional information.

12. Compare the animal production occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

AGRICULTURAL PRODUCTION

Plant Production: The principal activities deal with the quantity production of quality food and non-food needs for humans and other animals, as well as with the improvement of production practices by better seed selection; fertilizing programs; and planting, cultivating, and harvesting techniques.

OCCUPATION	D.O.T.
Farm manager	409.168
Farm foreman	401.138
Tenant farmer	409.181
Farm laborer	401.887
Custom farm equipment operator	409.883
Sharecropper	409.884
Grain and/or forage farmer	401.181
Head irrigator	422.137
Plant pathologist	041.081
Broker and market reporter	162.158
Farm advisor or consultant	096.128
Farm appraiser	191.287
Farm organization fieldman	191.368
Plant breeder, geneticist	041.081
Range technician or specialist	040.081
Soils scientist	040.081
Soil conservationist	040.081
Soil tester	029.281
Entomologist	041.081
Seed grower	406.181
Vegetable farmer	403.181
Fruit farm foreman	404.131
Orchardist	404.181
Market master	186.168
Plant taxonomist (Botanist)	041.081
Agronomist	040.081

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a group or individual can consider the many DECISION-MAKING aspects in a plant production occupation. Notes should be kept on these DECISION-MAKING opportunities for future discussion.

1. List crops which may be planted in the geographical area. Prepare a map indicating types of crops grown in that area or in other areas. Indicate the markets for these crops.

2. Plant and care for a given plot of ground. Keep a record from the time the ground is broken. Send soil samples to a testing laboratory. What does a soil test tell us? Divide the plot and try out two or more

methods of weed control. What influences the decision on methods of controlling weeds?

3. Visit a seed dealer. Find out necessary information about seed and plant selection and reproduction. How are seeds or plants selected? Show drawings of results of good or poor seeds.

4. Consult the county farm adviser about plant food requirements (i.e., nitrogen cycle). Write a report on the information.

5. Perform individual tests by planting seeds in two containers of poor soil; use fertilizer on one to see its affect on plant growth.

6. Make a display of ten food or fiber plants according to structure (stock, leaf, flower). Collect pictures of these plants and label them as to processes used for planting, growth, and harvesting.

7. Collect items from current newspapers and agricultural magazines which are concerned with the use of chemical fertilizers and their affect on the environment. Read each item, noting recommendations and governmental control. Are the recommendations personally agreeable? Why?

8. Make a study of the different planting and harvesting techniques. Make a chart showing which techniques cause erosion and which are used to prevent it.

9. Follow the commodity exchange for one or two weeks. What changes occurred and why?

10. Interview a person involved in plant production. Gather the following kinds of information from the interviewee and any reference materials available:

   a. Special skills and aptitudes required
   b. Educational requirements
   c. Working conditions and setting
   d. Employment possibilities
   e. Kinds of decisions made by the interviewee which led to his career choice
   f. Factors which influenced the career decisions made by the interviewee
   g. Decision-making ability as a factor for promotion or increase in production

11. Design a packet of materials which could introduce other students to the chosen occupation in the area of plant production. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number ten could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered to give additional information.

12. Compare the plant production occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

AGRICULTURAL PRODUCTION

Agricultural Business Management: The principal activities deal with budgeting (accounting), financing, managing, marketing, purchasing, personnel management, and economics.

OCCUPATION	D.O.T.
Agricultural economist	050.088
Agricultural statistician	020.188
Farm manager	180.168
Cooperative extension service workers	096.128
Machinery salesman	277.358
Grain elevator operator	162.168
Credit manager	168.168

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a group or individual can consider the many DECISION-MAKING aspects in an agricultural business management occupation. Notes should be kept on these DECISION-MAKING opportunities for future discussion.

1. Set up a budget for personal income and expenses for two or three weeks. Keep records. Make a bar graph showing what the sources of income were and how much was obtained from each source, as well as what items were bought and what amounts paid.

2. Observe one classmate for one hour each day for two or three days. Write down everything he does; then confer with him to relate any ways in which he could be more efficient.

3. Evaluate a choice item for sale by following market prices for a week or two (i.e., grain on commodity exchange). What factors caused a change; if no change, why?

4. Role play the hiring process including interviews, applications, etc. Decide and list desirable qualities in the employees.

5. Choose a new piece of equipment a farmer might purchase. Through visiting farm stores and checking catalogs, compare costs and decide his best buy.

6. Make a study of financing and crediting. Study the amount of capital or assets needed before a loan is granted. Using some hypothetical situations which involve farmers desiring credit for various reasons, study each situation and decide if credit could be given without risk.

7. Research three agribusiness organizations. What role do they play in agricultural production?

8. Survey the town (community) and keep a list of all agricultural businesses which are locally available to aid the farmer. List the primary duties of each service. If visits to the locations of each are made, observe the work setting and note which are personally desirable.

9. Have students interview a farm manager and a manager of a store. Gather some of the following information and show similarities and differences in managing a farm and another type of business:

a. Major characteristics
b. Types of records to be kept
c. Types of problems
d. Goals
e. Management skills required
f. Financial structure
g. Type of inventory
h. Factors that influence the success of the business
i. Factors that determine the price of the products sold
j. Reasons for insurance
k. Types of taxes
l. Personnel

10. Visit an agricultural extension office, Federal Land Bank, farm management service at a bank, a farm organization such as farm bureau, or a production credit association to find out what kind of services are available to an agricultural business. Be sure to investigate the use of computer programming in relation to farm business management.

11. Have the class gather some information to be put into a brochure which would describe the purpose of the United States Department of Agriculture. Be sure to include various types of careers.

12. Interview someone involved in agricultural business management. Gather the following kinds of information from the interviewee and any reference materials available:

a. Business management skills and aptitudes required
b. Educational requirements
c. Working conditions and setting
d. Employment possibilities
e. Kinds of decisions made by the interviewee which led to his career choice
f. Factors which influenced the career decisions made by the interviewee
g. Decision-making ability as a factor for promotion or increase in production

13. Design a packet of materials which could introduce other students to the chosen occupation in the area of agricultural business management. Include pictures of people at their work, the equipment they use, their work setting. Information gathered in activity number twelve could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered to give additional information.

14. Compare the agricultural business management occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

REFERENCES FOR ADDITIONAL INFORMATION

General:

Books

Arnold, Oren. *Aim for a Job in Cattle Ranching*. Richards Rosen, 1971. (9-12).
Beck, Barbara L. *Vegetables*. Watts, 1970. illus.
Buehr, Walter. *Food From Farm to Home*. Morrow, 1970. 94 p., illus. (4-6).
Hellman, Hall. *Feeding the World of the Future*. Lippincott, 1972. (7-9).
Hoover, Norman K. *Handbook of Agricultural Occupations*, 2nd ed. The Interstate Printers and Publishers, Inc., 1969.
Hutchison, Chester S. *Your Future in Agriculture*. Richards Rosen, 1965.
Lent, Henry B. *Agriculture U.S.A. America's Most Basic Industry*. Dutton, 1968. 160 p., illus. (5-7).
McCoy, J. J. *To Feed a Nation; The Story of Farming in America*. Nelson, 1970.
Scott, John. *Hunger: Man's Struggle to Feed Himself*. Parents' Magazine Pr., 1969. (7-12).
Sidney, Howard, editor. *Career Opportunities: Agricultural, Forestry, and Oceanographic Technicians*. S. G. Ferguson, 1969.
Stone, Archie A. *Careers in Agribusiness and Industry*, 2nd ed. The Interstate Printers and Publishers, Inc., 1970.
Sullivan, George. *How Do They Grow It?* Westminister Press, 1968. 151 p., illus., map (5-7).

Organizations

Brown Swiss Cattle Breeder's Association, P. O. Box 1028, Beloit, Wisconsin 53511.
California & Hawaiian Sugar Co., Public Relations Department, One California Street, San Francisco, California 94016.
Canada Department of Agriculture, Head, Distribution Unit Information Division, Room 139, Sir John Carling Building, Central Experimental Farm, Ottawa, Ontario, Canada.
Cotton & Cordage Research Branch, Plant Science Research Division ARS, USDA Plant Industry Station, Beltsville, Maryland 20705.
Northrup, King & Co., Mrs. Mary Fritz, 1500 Jackson Street, N. E. Minneapolis, Minnesota 55413.
Rice Council, P. O. Box 2280, Houston, Texas.
Sunkist Growers, Inc., P. O. Box 7888, Valley Annex, Van Nuys, California 91409.
U. S. Beet Sugar Association, Educational Materials, Box 500, Dansville, N. Y. 14437.
U. S. Department of Agriculture, Agricultural Research Center, Educational Services Branch, Beltsville, Maryland 20705.

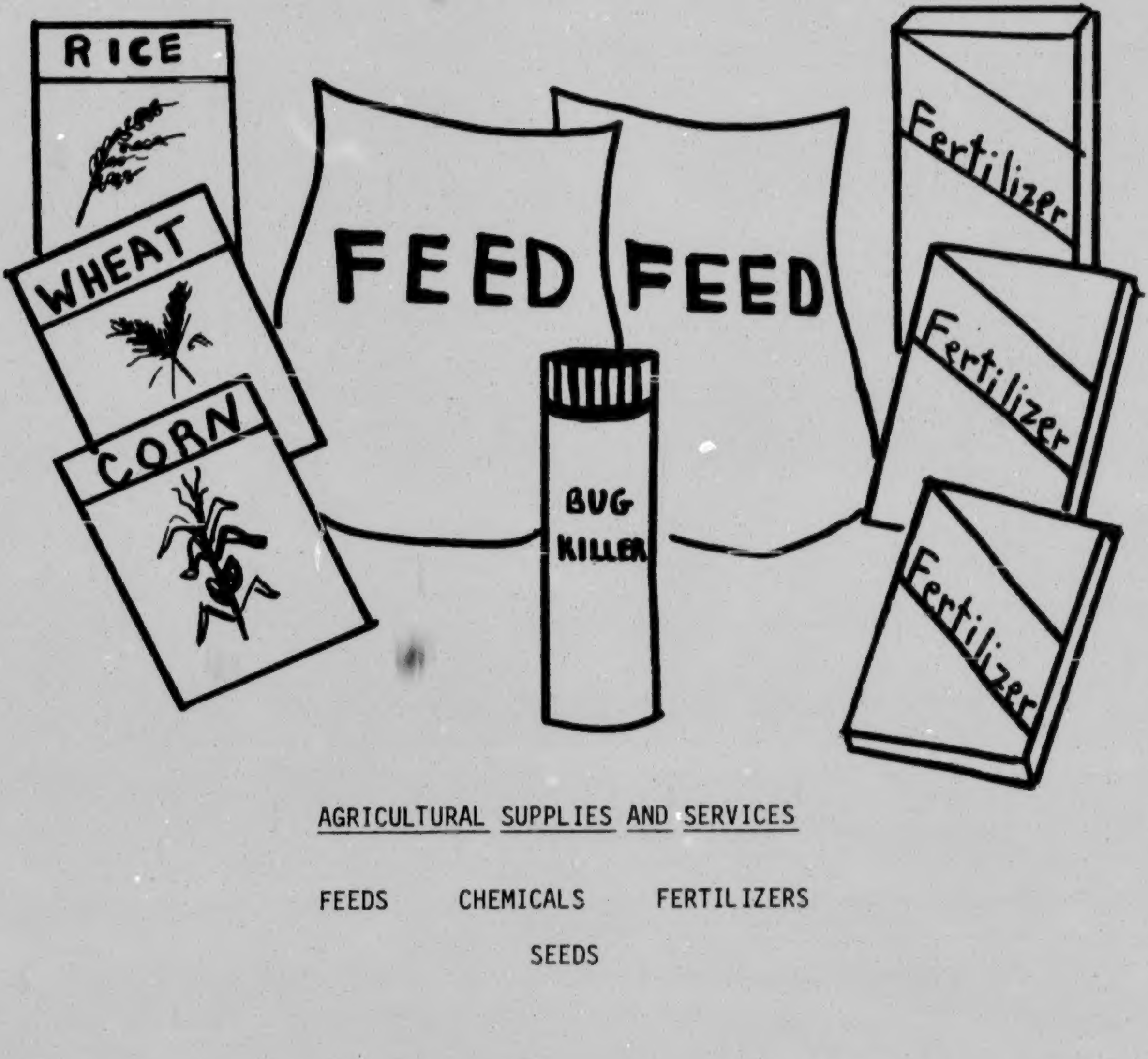
U. S. Department of Agriculture, Farmer Co-operative Service Publications, Washington, D. C. 20250.
U. S. Department of Agriculture, Office of Information, Publications Division, Washington, D. C. 20250.

Sources of Specific Occupational Information:

Dictionary of Occupational Titles. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.
Occupational Briefs. Chronicle Guidance Publications, Inc. Moravia, N. Y. 13118.
Occupational Briefs. Largo Career Briefs. Largo, Florida.
Occupational Briefs. Science Research Associates. 259 E. Erie St., Chicago, Illinois 60611.
Occupational Outlook Handbook. United States Department of Labor, Bureau of Statistics, Supt. of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

MAJOR CAREER DEVELOPMENT DIMENSION

COPING BEHAVIORS


RICE
WHEAT
CORN
FEED
FEED
BUG KILLER
Fertilizer
Fertilizer
Fertilizer

AGRICULTURAL SUPPLIES AND SERVICES

FEEDS CHEMICALS FERTILIZERS

SEEDS

BEFORE YOU BEGIN

For the convenience of both teacher and student, the materials in this study are divided into three sections. The last of these -- STUDENT ACTIVITIES -- is actually part of the second; it is presented as one piece, however, so that the teacher can easily lift it out, duplicate it, and distribute it to the class.

I. INSTRUCTIONAL INFORMATION

CAREER DEVELOPMENT CONCEPTS. These are the main concepts to be developed in this unit. The teacher should concentrate especially on the COPING BEHAVIORS subconcept *performance requirements for a job will vary with the work setting of the job* because of the wide variety of environments in which the worker in AGRICULTURAL SUPPLIES AND SERVICES may find himself. The other five interacting subconcepts further develop other understandings necessary for making career decisions.

INFUSED SUBJECT MATTER. This is a listing of some of the knowledge and skills acquired by this level of education. The subject matter is used in carrying out the student activities.

OCCUPATIONAL INFORMATION. For the benefit of the teacher, the several occupational areas with which the students are working in section three are also outlined here. Specific occupations in each of these areas are listed in the student section.

PUPIL PERFORMANCE OBJECTIVES. The teacher should consider these as the outcomes expected for the students by the end of the unit.

II. INSTRUCTIONAL ACTIVITIES

INTRODUCTORY ACTIVITIES. These are designed to interest the students in the subject matter of this unit, as well as to provide a controlled means of developing the career development concepts. The last of these activities should lead directly into . . .

INDIVIDUAL AND SMALL GROUP ACTIVITIES. On the basis of the last INTRODUCTORY ACTIVITY, the teacher should group the students into each occupational area and distribute to each group the information and activities for its chosen area. (See Section III below.) Students in each group can then choose which specific activities they would like to do. These activities are meant to give the student a few "hands-on" experiences with the kind of work encountered in the AGRICULTURAL SUPPLIES AND SERVICES occupations. The teacher is free to develop additional activities which could add to the student's understanding of this unit.

CULMINATION ACTIVITIES. After each individual or small group has completed its activity, the students should be given a chance to share their information. They may want to present their displays,

give their reports, or exchange their career packets for a few days. The teacher should also use the CULMINATION ACTIVITIES suggested.

EVALUATION ACTIVITIES. Some evaluation experiences are provided for the unit. Rather than prescribe formal testing, the materials give a suggestion for evaluating the career development concepts. Because the classroom teacher is the best qualified evaluator in her classroom, she should decide HOW a given knowledge or skill shall be demonstrated and the QUALITY and QUANTITY of knowledge or skill required for a particular child or group of children.

III. STUDENT ACTIVITIES. These activities are to be used by each group and are in the preceding section.

The numbers listed to the right of each occupation are taken from The Dictionary of Occupational Titles (D.O.T.), Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

I. INSTRUCTIONAL INFORMATION

CAREER DEVELOPMENT CONCEPTS

COPING BEHAVIORS

Major Concept	Individuals can learn to perform adequately in a variety of occupations and occupational environments.
Subconcept	*Performance requirements for a job will vary with the work setting of the job.*

ATTITUDES AND APPRECIATIONS

Major Concept	Society is dependent upon the productive work of individuals.
Subconcept	*Completion of a worthwhile task has value for the worker and for society.*

CAREER INFORMATION

Major Concept	Basic career information will aid in making career-related decisions.
Subconcept	*Occupations have their own work settings.*

EDUCATIONAL AWARENESS

Major Concept	Educational skills and experiences are related to the achievement of career goals.
Subconcept	*Knowledge and skills in subject areas are helpful in occupational competence.*

SKILL AWARENESS

Major Concept	All occupations require general and specific skills.
Subconcept	*Most occupations require knowledge and skills in communications, mathematics, organization, and/or problem solving.*

ECONOMIC AWARENESS

Major Concept	Basic economic understandings will aid in making career-related decisions.
Subconcept	*Additional training and experience increase earning potential.*

INFUSED SUBJECT MATTER

Mathematics
1. Graphs
2. Computing cost
3. Estimates
4. Addition
5. Adding machines
6. Cash register

Language Arts
1. Bulletin boards
2. Panel discussions
3. Creative writing
4. Narration
5. Interviews
6. Charts
7. Research
8. Reports
9. Biographies
10. Brainstorming
11. Role playing
12. Business telephone manners

Science
1. Animal and plant nutrition
2. Plant genetics
3. Field trips
4. Seed identification
5. Experiments
6. Insect identification
7. Chemicals
8. Soil testing

Social Studies
1. Geography
2. History

OCCUPATIONAL INFORMATION

Agricultural Supplies and Services

This occupational area is concerned with the production, processing, distribution, and use of consumable supplies used by the agricultural producer in the production of animals, plants, and their products. This area also includes services such as research, instruction, and application of materials as needed in the use of those supplies.

Feeds: The principal activities deal with preparing, selling, and researching feeds and feedstuffs and with providing quality control.

Chemicals: The principal activities deal with the researching, inspecting, distributing, and marketing of chemicals; with operating equipment used in application of chemicals; and with providing instruction as to their use.

Fertilizers: The principal activities deal with the mixing, blending, inspecting, marketing, and researching of fertilizers; making soil analyses; and applying chemical elements to the soil.

Seeds: The principal activities deal with cleaning, grading, inspecting, testing, researching, and marketing of seeds.

PUPIL PERFORMANCE OBJECTIVES

COPING BEHAVIORS

. . . list the performance requirements which would differ among jobs; i.e., a retail salesman or a wholesale salesman, a farm-to-farm salesman or a sales clerk in a store, a university demonstrator or a business demonstrator, a rural or urban serviceman or supplier.

ATTITUDES AND APPRECIATIONS

. . . make a diagram showing the flow of food from farm to consumer, indicating the positions of agricultural servicemen and suppliers.

CAREER INFORMATION

. . . identify at least three types of work settings identified with occupations in this area.

. . . write a statement as to why each setting is appealing or not appealing and how that setting would affect an occupational choice.

EDUCATIONAL AWARENESS

. . . identify the subject areas in which knowledge and skills would be needed by a person who would select an occupation in this area.

. . . identify those skills and knowledge in which the person is gaining competence.

. . . assess one's own ability to acquire the additional knowledge and skills needed for occupational competence in this area.

SKILL AWARENESS

. . . identify occupational tasks in this area which would require knowledge and skills in communications, mathematics, organization, and problem solving.

ECONOMIC AWARENESS

. . . outline a simple business heirarchy or career ladder up which, by ability and application of effort, one could progress from an entry level position to an executive position.

. . . express in writing the relationships of training and experience with increased production and earning potential.

II. INSTRUCTIONAL ACTIVITIES

The instructional activities have been designed to develop the CAREER DEVELOPMENT CONCEPTS using a variety of subject matter, knowledge and skills, and appropriate occupational information. The teacher may develop additional activities which could add to the student's understanding of this unit.

INTRODUCTORY ACTIVITIES	CAREER DEVELOPMENT CONCEPTS
1. Have the students identify some of the crops or livestock produced by farmers in their area. Divide the class into groups which will then select one crop or product and list the different items the farmer would purchase in order to produce the crop or product such as seed, feed, chemicals, and fertilizers. The kinds of knowledge the farmer would need to make a wise purchase should be identified. How would the salesman affect the choice? What competencies would the salesman need to help the farmer implement his choice?	*Knowledge and skills in subject areas are helpful in occupational competence.* **Educational Awareness**
2. Ask the students to use the yellow pages in the telephone book and identify businesses which provide agricultural supplies and services. Have them classify the various tasks of each as to over-the-counter sales; personal, on-the-site sales; research demonstration centers; business demonstration centers; rural or urban businesses, or retail or wholesale businesses. Identify the types of work setting of each business. Then they should list some communication, mathematic,	*Occupations have their own work settings.* **Career Information** *Most occupations require knowledge and skills in communications, mathematics, organization, and/or problem solving.* **Skill Awareness**

organization, and problem-solving skills needed by the employees in any of these work settings.

3. Have the class visit some of the businesses to find out
  a. Types of agricultural businesses they supply.
  b. Services and supplies they provide.
  c. Subject area knowledge or skills needed for job competence.
  d. The business hierarchy.
  e. Affect of training and experience on salary.
  f. Work settings.

Occupations have their own work settings.

Career Information

Knowledge and skills in subject areas are helpful in occupational competence.

Educational Awareness

Additional training and experience increase earning potential.

Economic Awareness

4. Ask the students to use the list of businesses researched and identify job requirements which would be the same and those that would be different according to the types of agribusiness serviced.

Performance requirements for a job will vary with the work setting of the job.

Coping Behaviors

5. Have the class display some samples of feeds, chemicals, fertilizers, and seeds. Using four groups of students, let them have a brainstorming session concerning the workers involved in the producing and distributing of each of the four supplies. Also, they could research the affect of the development of various chemicals, fertilizers, seeds, and quality feeds on agricultural production and consider the importance of this knowledge to the job of a salesman. Would he feel that he is an important part of the production process? Could his decisions affect an agricultural business?

Completion of a worthwhile task has value for the worker and for society.

Attitudes and Appreciations

6. Have the students assess their likes and dislikes.
General: I enjoy outdoor work; sales work; demonstrating; researching; meeting people; studying science and mathematics; and working with plants, animals, soil, or chemicals.
Specific: I am interested in providing feeds for proper animal

Performance requirements for a job will vary with the work setting of the job.

Coping Behaviors

nutrition, the production of seeds and their genetics, working with the improvement of soil and its productivity, or working with chemicals and doing experiments.

Use the assessment list developed in the last activity to help each student determine which of the areas listed below he would like to investigate.

SMALL GROUP OR INDIVIDUAL ACTIVITIES

See student pages:

	Feeds	- p. 41
	Chemicals	- p. 45
	Fertilizers	- p. 49
	Seeds	- p. 53

CULMINATION ACTIVITIES

1. Have each study-area group dramatize, in various simulated work settings, some of the activities of their area workers.

Occupations have their own work settings.

Career Information

2. Have each student make a list of skills and knowledge required by workers in the supplies and services area. From this list have the student identify those competencies he is acquiring, those he is interested in acquiring, and those which he is not interested in acquiring.

Most occupations require knowledge and skills in communications, mathematics, organization, and/or problem solving.

Skill Awareness

3. Have each group make a simple business hierarchy or career ladder which would show various positions from entry level to executive. From this hierarchy, have each student select the level he would like to make his goal. Encourage each student to outline the reasons for his particular goal selection and how he expects to attain that goal.

Additional training and experience increase earning potential.

Economic Awareness

4. Ask the class to make a large mural showing the many agricultural occupations which depend on the supplies and services area.

Completion of a worthwhile task has value for the worker and for society.

Attitudes and Appreciations

EVALUATION

Have each student make a list of some tasks which he would be required to perform if he selected an occupation in this area. Have the student identify any differences in performance requirements as the work setting changes.

RESOURCES

See "References for Additional Information" page.

III. STUDENT ACTIVITIES

AGRICULTURAL SUPPLIES AND SERVICES

Feeds: The principal activities deal with preparing, selling, and researching feeds and feedstuffs and with providing quality control.

OCCUPATION	D.O.T.
Feed grinder	521.885
Feed mixer or grinder helper	520.886
Feed mill superintendent	529.138
Feed mill foreman	529.132
Feed salesman	277.358
Feed sales manager	163.118
Feed company farm advisor	096.128
Feed store manager	183.118
Animal nutritionist	040.081
Agri-marketing specialist	050.088
Research technician	199.384
Grain mill products inspector	529.387
Grain elevator operator	162.168

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a group or individual can make a list of the principal activities that one would engage in if he were concerned with feeds in agricultural supplies and services and of the various environments in which he might work. The plausible steps of progression from one's first job to the top job in a particular area could be discovered. Lists of the educational requirements and experience necessary for this advancement to take place can be made.

1. Visit a farm to observe the animals at feeding time. How long does it take the various animals to eat? What does the feed look like? Talk with the farmer, asking such questions as: What feed does he use? Where does it come from? How is it prepared? How does the farmer figure his profit in raising animals? Record the conversation on a cassette tape.

2. Organize a panel to debate the practice of using certain chemicals or drugs to fatten animals faster. Discuss the chemicals used and the animals that receive them and the dangers and economics involved. Give classmates ample opportunity to react.

3. Make a bulletin board of animal feeds. Picture the animal, the food he eats, and how often he eats. Then calculate how much it costs to feed him per week.

4. Suppose an involvement with advertising of a company's feed. Find out how much it costs to advertise in a newspaper or magazine. Which magazines whould be picked for an ad? Why? Design and write feed ads. Choose the ones that could be used in an advertising campaign.

5. Write a report answering the following questions: How can a person determine whether or not an animal is being properly fed? What are the characteristics of a healthy animal? What is meant by the term "bloom" when applied to an animal? What affect does feed have on the meat, milk, and eggs we eat?

6. Find out what crops are grown in our country for feed. Make a map of the U. S. showing the principal areas where each is produced. Make a graph showing how each ranks in volume of production in the United States. List and rank the states which lead in the production of each? What nutrients are necessary in the soil to produce the best grains for feed? What insects harm these crops?

7. Make an oral report about a ration. Tell the characteristics of a good ration, the things considered about an animal in determining the type of ration for it, and the necessary ingredients. Make a recipe for a ration including meal, mash, grain, meat scraps, minerals, and rations.

8. Feed a pet different types of pet food and keep a record of his reactions to each. Also keep a record of which he preferred; the ingredients listed on the can, box, etc.; and the cost of this food. What conclusions can be reached?

9. Discuss the duties of a feed salesperson. On the chalkboard, list some of the personal qualities needed in selling. Role play a feed salesperson and a "difficult" customer. Follow with a comparison of the salesperson's qualities and those listed previously. Each student might like to match his own qualities with those on the list.

10. Find and study articles in newspapers or magazines relating to the cost of meat. Why do meat prices change? What is the cause and the solution? Does the cost of feed have anything to do with the change? Why would feed prices change?

11. Pretend that there is a fair in town. Set up a booth for one company's brand of feed. Think of ways to attract people to an exhibit. Discuss which booths the class liked best and why.

12. Visit a feed store and find out what information goes on a commercial feed tag. Find out how the feed is selected and how the clerk helps the customer select the feed he needs.

13. Select one of the Agricultural Supplies and Services occupations suggested and research it. If possible, interview someone in this area. Gather the following information from an interviewee and any reference material available:

a. Special skills and aptitudes required
b. Educational requirements
c. Working conditions and setting
d. Employment possibilities and methods of advancement
e. Techniques of communications, organization, and problem-solving

f. Applications of mathematics
g. Summer or seasonal job opportunities

14. Design a packet of materials which could introduce other students to the chosen occupation in the area of Feeds. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number thirteen could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered and to give additional information.

15. Compare the chosen occupation dealing with feed with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

AGRICULTURAL SUPPLIES AND SERVICES

Chemicals: The principal activities deal with researching, inspecting, distributing, and marketing of chemicals; with operating equipment used in application of chemicals; and with providing instruction as to their use.

OCCUPATION	D.O.T.
Ag. chemical equipment operator	409.883
Aerial spray operator	196.283
Ag. chemical salesman	277.358
Ag. chemical product serviceman	180.118
Ag. chemical sales manager	163.118
Ag. chemical store manager	183.118
Ag. chemicals inspector	168.287
Weed abatement foreman	096.168
Ag. extension specialist	096.128
Plant pathologist	070.081
Ag. chemist	022.081
Agri-marketing specialist	050.088

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a group or individual can make a list of the principal activities that one would engage in if he were concerned with Chemicals in Agricultural Supplies and Services and of the various environments in which he might work. The plausible steps of progression from one's first job to the top job in a particular area can be found. Lists of the educational requirements and experience necessary for this advancement to take place can be made.

1. Visit a farm to observe the animals at feeding time. How long does it take the various animals to eat? What does the feed look like? Talk with the farmer, asking such questions as: What feed does he use? Where does it come from? How is it prepared? How does the farmer figure his profit in raising animals? Where does he get his feed? Record the conversation on a cassette tape.

2. Organize a panel to debate the practice of using certain chemicals or drugs to fatten animals faster. Discuss the chemicals used, the animals that receive them, and the dangers and economics involved. Give classmates ample opportunity to react.

3. Make a bulletin board of animal feeds. Picture the animal, the food he eats, how often he eats, and calculate how much it costs to feed him per week.

4. Do research on destructive rodents. Find out what different types look like, what they eat, where they keep their young, what enemies they have, what damage they do, and which methods are used to control them. Give a report to the class.

5. Look through some agricultural magazines such as Farm Journal and the American Farmer and note how various companies advertise their pesticides, herbicides, and fungicides. Imagine being the public-relations man for one of these companies. Give the company a name, and write an ad for the product.

6. Photograph plants which have been damaged by insects, weeds, or diseases. Identify the source of damage in each case.

7. Make a bulletin board depicting helpful and harmful insects. Include such insects as the praying mantis, ladybug, bees, silkworm, dragonfly, boll weevil, grasshopper, corn borer, aphid, Mexican bean beetle, and coddling moth. Identify their enemies and their methods of destruction (tearing, sucking, cutting, chewing, or tunneling).

8. Identify the circumstances under which a plant is a weed. Find out the role chemicals play in preventing undesirable weeds from growing in a garden or lawn. What is the danger in using them? Visit a hardware store or agricultural supply store and see the different types of weed killers they have. What common ingredients do most of them seem to have? What other ingredients do they have? Are there any warnings listed on the containers? Calculate the cost of various brands if spread on a small garden or large acreage.

9. List three ways that weeds are propagated from one area to another. What agents contribute to the spreading of weeds? Collect and identify five weeds and discuss their means of reproduction.

10. Find out about the different chemicals used around the house to control insects, pests or fungi. Are they harmful to plants and animals? What safety precautions are listed on the containers? What other information is listed on the containers? Where are the containers kept?

11. Use the "Man-on-the-Street" interview technique and ask students or others their opinions on the use of chemical warfare in dealing with pests and insects. Tape record their answers.

12. Do some research into the history of pesticides, insecticides, and fungicides. What were some early methods of control? Identify some insects that have become immune to one method of control necessitating research into other methods.

13. Formulate some safety rules for handling chemical products. Make a chart for the class. Display specific products and identify specific dangers involved in certain types of containers regarding their use and storage.

14. Invite a salesman who sells chemicals to visit the class, and let him demonstrate his sales technique. Find out what other duties he performs, and ask how he started out as a salesman.

15. Make a report on one of the following: pesticides in water, pesticides in soil, pesticides and wild animals, or pesticides and birds.

16. Select one of the Chemical occupations in Agricultural Supplies and Services suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

a. Special skills and aptitudes required
b. Educational requirements
c. Working conditions and setting
d. Employment possibilities and methods of advancement
e. Techniques of communications, organization, and problem-solving
f. Applications of mathematics
g. Summer or seasonal job opportunities

17. Design a packet of materials which could introduce other students to the occupation chosen in the area of Chemicals. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number sixteen could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered and to give additional information.

18. Compare the chosen occupation dealing with Chemicals with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

AGRICULTURAL SUPPLIES AND SERVICES

Fertilizers: The principal activities deal with the mixing, blending, inspecting, marketing, and researching of fertilizers; making soil analyses; and applying chemical elements to the soil.

OCCUPATION	D.O.T.
Mixer and blender operator	520.885
Formulation specialist	559.782
Fertilizer salesman	277.358
Fertilizer company representative	180.168
Fertilizer plant manager	183.118
Fertilizer store manager	183.118
Feed and fertilizer inspector	096.168
Agronomist	040.081
Agricultural chemist	022.081
Research technician (lab technician)	199.384
Agri-marketing specialist	050.088

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a group or individual can make a list of the principal activities that one would engage in if he were concerned with Fertilizers in Agricultural Supplies and Services and of the various environments in which he might work. The plausible steps of progression from one's first job to the top job in a particular area can be found. Lists of educational requirements and experience necessary for this advancement to take place can be made.

1. Find out what minerals are most important to plants, why soil becomes useless if the same plants are grown in the same place year after year, and what things can be done to improve soil that does not have enough of the elements plants need.

2. Do an experiment to demonstrate that the earth has many types of soils by mixing a handful of soil with enough water to form a paste in a glass jar. Fill the jar almost full with water, fasten cover, and shake a minute. Leave jar for awhile and then observe the coarse material on the bottom -- sand, the next layer of fine particles -- clay, and the brownish residue of humus on the top.

3. Find out how to test soils with litmus paper which can be obtained from the chemistry department. Some soils are sweet (alkaline) and some are sour (acid). Bring in different types of soil and determine their acidity. Why would someone working in fertilizers need to know how to perform this experiment? What is added to soil to neutralize it?

4. Visit a store that sells fertilizers. Find out how many different types they sell. Find out what kinds of minerals each contains. When do

they recommend using the fertilizers? Are there any precautions listed on the label? What other information is listed?

5. Imagine being the manager of a fertilizer plant. What problems might there be with people in the immediate neighborhood? What might be done to offset these problems?

6. Have a county agricultural agent visit the class and tell about the importance of soils containing proper phosphorus, potassium, nitrogen, and magnesium in the production of quality crops. If possible, have him show plant samples of what happens when each of the necessary nutrients is missing from the soil.

7. Find out the duties of a salesman in the area of fertilizers. Watch how a cash register is operated. Explain to the class the proper usage of one. Also find out how to use an adding machine and, if possible, practice using a real one. Get some sales order forms, make some copies, and practice filling out some orders.

8. Set up a controlled experiment to show the affect of different fertilizers on plants.

9. Set up a display advertising a brand of fertilizer.

10. Prepare a bulletin board displaying the work of an agronomist.

11. Are vitamins necessary for plant growth? Get a bottle of vitamin B_1 tablets for plants at a seed store. Get slips of common household plants (two of each) and two young growing plants about the same size in the same kind of pot and soil. Put the slips in a small jar. Mix up vitamin B_1 solution in a jar and have plain water in another. Give one solution to one slip and one to the other. Do the same with the plants. Observe each day for several weeks, adding equal amounts of water when needed. Make records of the root development of the slips and the growth of the plants. What conclusions can be drawn?

12. Remove carefully some alfalfa or clover plants from a field and wash the roots. Examine the roots for swelling or nodules which are made when nitrogen-fixing bacteria enter the roots. Crush a nodule into a drop of water and notice the milky fluid for black specks. These are the nitrogen-fixing bacteria. Find out the importance of nitrogen-fixing bacteria on plants.

13. Research the use of ammonia in agriculture. Find out why nitrogen-fixing bacteria are necessary for plant growth. What is the service related to ammonia which a farmer might need?

14. Imagine how scientists react to accusations by food faddists that the new fertilizers reduce the nutritional value of food and are poisons when applied to the soil? Collect classmates' opinions. Are there any dangers from using only organic matter for fertilizing? Would there be any affect in the quantity and quality of foods produced?

15. Find out the composition of lime. How is it important to soil? The following areas are rich in lime: Southeast Russia, Flanders, the Valley of Clyde in Scotland, and the bluegrass region of Kentucky. What evidence indicates the affect of lime on livestock? What famous animals come from these areas?

16. Investigate soil samples for animal life; i.e., worms, insects, spiders, etc. Select soil from various areas for an investigation. Which soil has the most small animal life? Does the amount of animal life have any relationship to the looseness of the soil?

17. Select one of the fertilizer occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

a. Special skills and aptitudes required
b. Educational requirements
c. Working conditions and setting
d. Employment possibilities and methods of advancement
e. Techniques of communications, organization, and problem-solving
f. Applications of mathematics
g. Summer or seasonal job opportunities

18. Design a packet of materials which could introduce other students to the occupation chosen in the area of Fertilizers. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number seventeen could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered and to give additional information.

19. Compare the chosen occupation dealing with fertilizers with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

AGRICULTURAL SUPPLIES AND SERVICES

Seeds: The principal activities deal with cleaning, grading, inspecting, testing, researching, and marketing of seeds.

OCCUPATION	D.O.T.
Seed cleaner operator (agri.)	551.885
Seed grader (grader man, agri.)	521.885
Seed mill foreman (grain and feed mill)	529.132
Seed mill helper (grain and feed mill)	520.886
Seed salesman (whole tr.)	277.358
Seed company fieldman	165.068
Seed company manager	183.118
Seed store manager (branch manager)	183.118
Agronomist	040.081
Seed inspector (gov. ser.)	096.168
Geneticist - botanist	041.081
Seed analyst - farm seed specialist	040.381
Research technician	199.384
Agri-marketing specialist	050.088

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a group or individual can make a list of the principal activities that one would engage in if he were concerned with Seeds in Agricultural Supplies and Services and of the various environments in which he might work. The plausible steps of progression from one's first job to the top job in a particular area can be found. Lists of the educational requirements and experience necessary for this advancement to take place can be made.

1. Visit a seed store and notice the many varieties of seeds sold. What information is listed on each package? Ask about the state and federal laws regarding seed tags and labels. Ask to see a seed catalogue if the manager has one.

2. Observe a salesman or saleswoman in action. How did he meet the customers and present his supplies? Did he answer their questions? How did he close the sales? What different types of customers did he have? Did he use the telephone at any time?

3. Make a seed catalogue. Show what seeds are for sale, the appearance of the seeds, the full grown plant, and the cost. Have students fill out order blanks for their purchases and total the amount of sales for the day.

4. Investigate the prices of seedlings and packages of seeds. Estimate the number of seeds per package and find out the germination rate. How many plants can be expected to grow? Estimate the cost per plant.

Compare to the cost of seedlings. Which costs more? Why? Are there advantages to buying seeds instead of seedlings?

5. Do some research on George Washington Carver or Luther Burbank and identify the work they did with seeds. Write a biography of one of them, including his important contributions.

6. Cut open various fruits such as tomatoes, cantaloupes, squash, apples, and watermelons. Observe differences in the size, color, number, and location of seeds and make a chart exhibiting and labeling each.

7. Imagine entering the 1957 contest of a seed catalogue company. A prize of $10,000 is offered to the first person to send in seeds that grow the first white marigolds. Write a short article about what the company would do with these seeds.

8. Bring some sunflower seeds for the class to sample. Make a bulletin board showing the uses of sunflower seeds. Is this crop becoming more important?

9. View an especially productive or beautiful flower garden, vegetable garden, or lawn in the neighborhood. Ask the tender what types of seeds were used, what kinds of fertilizers were applied, and how the weeds were controlled. Find out the amount of time spent working with the lawn or garden.

10. Make a list of all the plants man cultivates for its seeds. Make a chart which identifies the parts of a seed which have special uses.

11. Find out the difference between grains, legumes, and grasses. Identify the common ones in the area. Make a display of the seeds and the grown plant, separating them into grains, legumes, and grasses.

12. Find out differences between the common pasture and range grass. Make drawings of each and describe the season in which they are grown. Are there some in the fields around the neighborhood.

13. Find out the proper usage of the telephone for business transactions. Write out some possible phone conversations that would be conducted between workers in supplies and services and their customers. With the use of a toy telephone, act these out.

14. Research the history of popcorn. Find out why popcorn pops? Make a display of different types of popcorn. Are any of the agricultural supplies and services involved in the buying, selling, or growing of this seed?

15. Select one of the Seeds occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

a. Special skills and aptitudes required
b. Educational requirements

   c. Working conditions and setting
   d. Employment possibilities and methods of advancement
   e. Techniques of communications, organization, and problem-solving
   f. Applications of mathematics
   g. Summer or seasonal job opportunities

16. Design a packet of materials which could introduce other students to the occupation chosen in the area of Seeds. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number fifteen could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered and to give additional information.

17. Compare the chosen occupation dealing with seeds with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

REFERENCES FOR ADDITIONAL INFORMATION

General:

Books

Agricultural, Forestry, Oceanographic Technicians. Sidney, Howard (ed.). Chicago, Illinois, J. G. Ferguson, 1969.

The American Farmer. 225 Touhy Avenue, Park Ridge, Illinois 60068.

Farm Journal. Washington Square, Philadelphia, Pa.

Nation's Agriculture. 225 West Touhy Avenue, Park Ridge, Illinois 60068.

Oklahoma Vocational Agriculture Education. Basic Core Curriculum, I and II. State Department of Vocational and Technical Education, Stillwater, Oklahoma 74074.

A Teaching Guide for Career Orientation in Applied Biological Agricultural Occupations. February, 1973. Division of Agriculture Education, Dept. of Vocational and Technical Education, University of Illinois, Urbana, Illinois 61801.

Audio-Visuals

Occupations in Agricultural Supply and Service and *Salesmanship in Agriculture Business.* Vocational Agriculture Service, VASU of Illinois, College of Agriculture, 434 Mumford Hall, Urbana, Illinois 61801. slide - filmstrip.

Feeds:

Books

Cossard, Daniel W. and Jurgenson, Alwood M. *Approved Practices in Feeds and Feeding.* The Interstate Printers and Publishers, Danville, Illinois, 1963.

Stevens, Vernon; Luce, William G. and Gill, Don R. *OSU Extension Facts*, "Swine Nutrition." Oklahoma University, Stillwater, Oklahoma 74074.

Feeding Dairy Cattle. Farmer Bulletin #2153, U. S. Department of Agriculture.

Salesmanship in Ag. Business. Booklet, Vocational Agriculture Service, College of Agriculture, University of Illinois, Urbana, Illinois 61801.

Organizations

American Feed Manufacturers Ass'n., 53 West Jackson Boulevard, Chicago, Illinois 60604.

Chemicals:

Books

Flora, Newton W. *OSU Extension Facts*, "Pesticides Can Be Used Safely." Oklahoma State University, Stillwater, Oklahoma 74074.

Handbook of the Insect World. Hercules Powder Co., Wilmington, Delaware.

Handling and Using Agricultural Chemicals Safely. Vocational Agriculture Service, University of Illinois, Urbana, Illinois 61801.

Pesticides in the Modern World. A symposium prepared by members of the Cooperative Program of Agro-Allied Industries with FAO and other U. N. Organizations, 1972. Newgate Press Ltd., London, England.

Salesmanship in Agriculture Business. Booklet, Vocational Agriculture Service, College of Agriculture, University of Illinois, Urbana, Illinois 61801.

Weed Control, Cultural and Chemical. Department of Agriculture Education, Ohio State University, Columbus, Ohio.

Organizations

National Agricultural Chemicals Ass'n., The Madison Building, 1155 - 15th Street N. W., Washington, D. C. 20005.

Fertilizers:

Books

Abraham, George and Katy. The "Good Earth" Has Many Soils, Green Thumb Tricks. The Instructor (April, 1973). Dansville, N. Y. 14437.

Hughes, Harold D. and Henson, Edward R. Crop Production. The McMillan Co., N. Y., 1967.

Wilson, Harold K. and Richer, A. Chester. Producing Farm Crops. The Interstate Printers and Publishers, Inc., Dansville, Illinois.

A Challenge For You in Agronomy. Department of Agronomy, College of Agriculture, University of Illinois, Urbana, Illinois 61801.

How Healthy Are Health Foods? Better Homes and Gardens (June, 1972). Gerald M. Knox, Meredith Corp., 1716, Locust Street, Meredith Building, Des Moines, Iowa 50336.

Hungry Soil. John Deere, Moline, Illinois.

Salesmanship in Agriculture Business. Booklet, Vocational Agriculture Service, College of Agriculture, University of Illinois, Urbana, Illinois 61801.

Teaching Soil and Water Conservation, A Classroom and Field Guide. Soil Conservation Service, U. S. Department of Agriculture, Washington, D. C.

The Use of the Cash Register. Vocational Agriculture Service, College of Agriculture, University of Illinois, Urbana, Illinois 61801.

Seeds:

Books

Abraham, George and Katy. "Making Cosmetics in the Classroom," Green Thumb Tricks. The Instructor (November, 1972), Dansville, N. Y. 14437.

Hughes, Harold D. and Henson, Edward R. Crop Production. The McMillan Co., N. Y. 1967.

Kinnear, Herb. "Keep an Eye on the Sunflower," The American Farmer (February, 1973). 225 Touhy Avenue, Park Ridge, Illinois 60068.

Wilson, Harold K. and Richer, A. Chester. *Producing Farm Crops*. The Interstate Printers and Publishers, Inc., Danville, Illinois.

A Challenge For You in Agronomy. Department of Agronomy, College of Agriculture, University of Illinois, Urbana, Illinois 61801.

Salesmanship in Ag. Business. Booklet, Vocational Agriculture Service, College of Agriculture, University of Illinois, Urbana, Illinois 61801.

Some Identifying Characteristics of 52 Ohio Seeds. Department of Agriculture Education, Ohio State University, Columbus, Ohio.

Sources of Specific Occupational Information:

Dictionary of Occupational Titles. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

Occupational Briefs. Chronicle Guidance Publications, Inc., Moravia, N. Y. 13118.

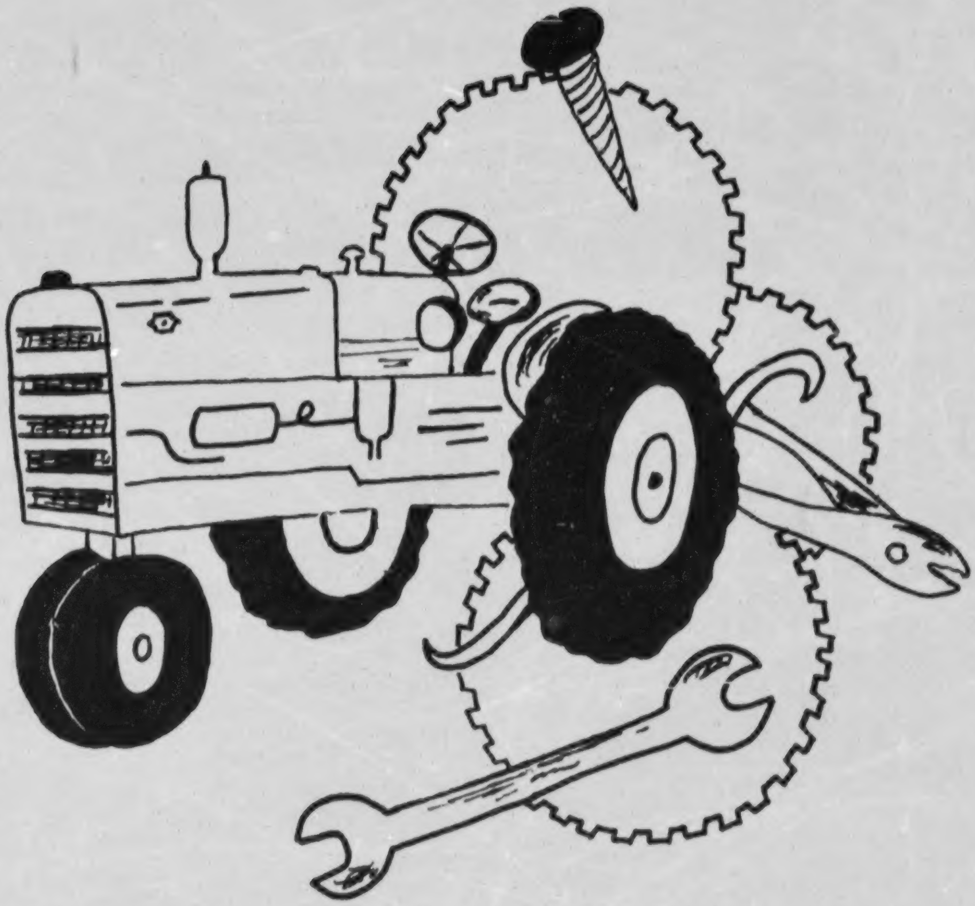
Occupational Briefs. Largo Career Briefs. Largo, Florida.

Occupational Briefs. Science Research Associates, 259 E. Erie Street, Chicago, Illinois 60611.

Occupational Outlook Handbook. United States Department of Labor, Bureau of Statistics, Supt. of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

MAJOR CAREER DEVELOPMENT DIMENSION

SELF-DEVELOPMENT



AGRICULTURAL EQUIPMENT AND MECHANICS

POWER, MACHINERY, AND TOOLS AGRICULTURAL STRUCTURES

SOIL AND WATER MANAGEMENT

ELECTRIFICATION

BEFORE YOU BEGIN

For the convenience of both teacher and student, the materials in this study are divided into three sections. The last of these -- STUDENT ACTIVITIES -- is actually part of the second; it is presented as one piece, however, so that the teacher can easily life it out, duplicate it, and distribute it to the class.

I. INSTRUCTIONAL INFORMATION

CAREER DEVELOPMENT CONCEPTS. These are the main concepts to be developed in this unit. The teacher should concentrate especially on the SELF-DEVELOPMENT subconcept *an individual is influenced by economic forces* as this particular subconcept is appropriate to the study of occupations in AGRICULTURAL EQUIPMENT AND MECHANICS. The other five interacting subconcepts further develop other understandings necessary for making career decisions.

INFUSED SUBJECT MATTER. This is a listing of some of the knowledge and skills acquired by this level of education. The subject matter is used in carrying out the student activities.

OCCUPATIONAL INFORMATION. For the benefit of the teacher, the several occupational areas with which the students are working in section three are also outlined here. Specific occupations in each of these areas are listed in the student section.

PUPIL PERFORMANCE OBJECTIVES. The teacher should consider these as the outcomes expected for the students by the end of the unit.

II. INSTRUCTIONAL ACTIVITIES

INTRODUCTORY ACTIVITIES. These are designed to interest the students in the subject matter of this unit, as well as to provide a controlled means of developing the career development concepts. The last of these activities should lead directly into . . .

INDIVIDUAL AND SMALL GROUP ACTIVITIES. On the basis of the last INTRODUCTORY ACTIVITY, the teacher should group the students into each occupational area and distribute to each group the information and activities for its chosen area. (See Section III below.) Students in each group can then choose which specific activities they would like to do. These activities are meant to give the student a few "hands-on" experiences with the kind of work encountered in the AGRICULTURAL EQUIPMENT AND MECHANICS occupations. The teacher is free to develop additional activities which could add to the student's understanding of this unit.

CULMINATION ACTIVITIES. After each individual or small group has completed its activity, the students should be given a chance to share their information. They may want to present their displays,

give their reports, or exchange their career packets for a few days. The teacher should also use the CULMINATION ACTIVITIES suggested.

EVALUATION ACTIVITIES. Some evaluation experiences are provided for the unit. Rather than prescribe formal testing, the materials give a suggestion for evaluating the career development concepts. Because the classroom teacher is the best qualified evaluator in her classroom, she should decide HOW a given knowledge or skill shall be demonstrated and the QUALITY and QUANTITY of knowledge or skill required for a particular child or group of children.

III. STUDENT ACTIVITIES. These activities are to be used by each group and are in the preceding section.

The numbers listed to the right of each occupation are taken from The Dictionary of Occupational Titles (D.O.T.), Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402

I. INSTRUCTIONAL INFORMATION

CAREER DEVELOPMENT CONCEPTS

SELF-DEVELOPMENT

Major Concept	Social, economic, educational, and cultural forces influence self-development.
Subconcept	*An individual is influenced by economic forces.*

CAREER INFORMATION

Major Concept	Basic career information will aid in making career-related decisions.
Subconcept	*Occupations require the use of specific materials and equipment.*

EDUCATIONAL AWARENESS

Major Concept	Educational skills and experiences are related to the achievement of career goals.
Subconcept	*Career-oriented learning may take place in or out of school.*

ATTITUDES AND APPRECIATIONS

Major Concept	Society is dependent upon the productive work of individuals.
Subconcept	*A given work setting requires certain policies and procedures.*

SKILL AWARENESS

Major Concept	All occupations require general and specific skills.
Subconcept	*All workers require skills to search for, locate, and obtain career placement on an initial basis and for advancement.*

ECONOMIC AWARENESS

Major Concept	Basic economic understanding will aid in making career-related decisions.
Subconcept	*Additional training and experience increase earning potential.*

INFUSED SUBJECT MATTER

Mathematics
1. Cost
2. Area
3. Measurements
4. Statistics
5. Metric system of measurement

Language Arts
1. Dictionary skills
2. Interviews
3. Discussion
4. Research skills
5. Presentations -- speeches
6. Vocabulary skills

Science
1. Conservation
2. Scale drawings
3. Changes in matter and energy
4. How objects move, motion and direction
5. Electricity and magnetism
6. Simple machines

Social Studies
1. Map skills
2. Geography
3. Natural resource's affect on economy
4. History's affect on present day
5. Land forms

OCCUPATIONAL INFORMATION

Agricultural Equipment and Mechanics

Agricultural equipment and mechanics is the developing of new and improved agricultural equipment and structures, their operation and maintenance; the solving of soil and water problems; the designing and supervising of irrigation systems; and the designing and using of various power systems.

Power, Machinery, and Tools: The principal activities in this area deal with the gaining and using of knowledge and skills for the purchase, operation, and maintenance of agricultural equipment; selling, servicing, and repairing of agricultural equipment and parts; and the development or improvement of agricultural equipment.

Agricultural Structures: The principal activities in this area deal with the design, construction, and maintenance of agricultural structures.

Soil and Water Management: The principal activities in this area deal with designing and constructing water and soil management structures.

Electrification: The principal activities in this area deal with the gaining of knowledge of the principles of electricity and applying those principles as related to the design, operation, and maintenance of agricultural structures and equipment.

PUPIL PERFORMANCE OBJECTIVES

SELF-DEVELOPMENT

. . . list some economic factors which could affect a person employed in any occupation.

. . . list some ways the employee can plan for economic changes.

CAREER INFORMATION

. . . identify, from a list of tools and materials used in occupations, those which are used by an agricultural mechanic.

EDUCATIONAL AWARENESS

. . . list some skills of an agricultural mechanic which are usually learned in school, and list those which can be learned only on the job.

ATTITUDES AND APPRECIATIONS

. . . describe the responsibilities and requirements of occupations in a particular area of agricultural mechanics.

. . . compare those responsibilities and requirements with an occupation in an area other than agricultural mechanics.

SKILL AWARENESS

. . . identify and evaluate the career placement agencies which are available to workers.

ECONOMIC AWARENESS

. . . outline the heirarchy of training involved in specific jobs within the area of agricultural mechanics and relate it to earning potential.

II. INSTRUCTIONAL ACTIVITIES

The instructional activities have been designed to develop the CAREER DEVELOPMENT CONCEPTS using a variety of subject matter, knowledge and skills, and appropriate occupational information. The teacher may develop additional activities which could add to the student's understanding of this unit.

INTRODUCTORY ACTIVITIES	CAREER DEVELOPMENT CONCEPTS
1. Prepare several sacks or other containers holding small items suggesting agricultural mechanics occupations. These items may include toy farm implements and agricultural structures, small hand tools, and actual machinery and equipment parts. Assemble enough containers for each small group to have a different one. As each group examines its own container, have students make a list of occupations suggested to them by items from their container.	*All workers require skills to search for, locate, and obtain career placement on an initial basis and for advancement.* **Skill Awareness**
2. Have the students compile a list of past, present, and future problems a farmer might have or may encounter in the area of agricultural mechanics. How has modern technology affected their solution? Has the level of the economy affected individuals who solve these problems?	*An individual is influenced by economic forces.* **Self-Development** *Additional training and experience increase earning potential.* **Economic Awareness**
3. Have the students investigate the hazardous occupations in the area of agricultural mechanics. Identify precautions which are used to avoid accidents.	*A given work setting requires certain policies and procedures.* **Attitudes and Appreciations**
4. Have the students make a list of businesses which would use people skilled in agricultural mechanics. Identify those which are close enough to be visited.	*Career-oriented learning may take place in or out of school.* **Educational Awareness**
5. Let the students compare the job descriptions of urban and rural electricians, carpenters, mechanics, etc. Are there any significant differences in their policies and procedures? Perhaps a presentation could be given by a group of students demonstrating the likenesses and differences.	*A given work setting requires certain policies and procedures.* **Attitudes and Appreciations**
6. Invite the occupational guidance counselor and other placement agencies to present to the class the contribution they can make in locating career information and opportunities.	*All workers require skills to search for, locate, and obtain career placement on an initial basis and for advancement.* **Skill Awareness**

7. Show the filmstrip, "Think Big," on career opportunities in agricultural mechanics. Discuss it with the class.

Career-oriented learning may take place in or out of school.

Educational Awareness

8. Have the students assess their likes and dislikes as follows. I am interested in machinery and tools, construction and maintenance of agricultural buildings and facilities, designing ways land can be irrigated to make it more useful, and electricity and its agricultural uses.

Occupations require the use of specific materials and equipment.

Career Information

Use the assessment list developed in the last activity to help each student determine which of the areas listed below he would like to investigate.

SMALL GROUP OR INDIVIDUAL ACTIVITIES

See student pages:

Power, Machinery and Tools - p. 73
Agricultural Structures - p. 77
Soil and Water Management - p. 79
Electrification - p. 81

CULMINATION ACTIVITIES

1. Use the format of "What's My Line" so that the student can use what he has learned about a particular occupational area of agricultural mechanics to answer such questions as the following: Does the job deal with people, ideas, things, or combinations of all three? What are some of the skills needed to do the job? What are some of the tools and materials used in this job? Are there special procedures which must be followed? How much education is required? Does education improve the working conditions and increase earning potential? Would an individual in this occupation be affected by the national economy? Where can one learn more about this occupation?

An individual is influenced by economic forces.

Self-Development

Occupations require the use of specific materials and equipment.

Career Information

Career-oriented learning may take place in or out of school.

Educational Awareness

A given work setting requires certain policies and procedures.

Attitudes and Appreciations

All workers require skills to search for, locate, and obtain career placement on an initial basis and for advancement.

Skill Awareness

Additional training and experience increase earning potential.

Economic Awareness

2. Ask the students to prepare a list of the economic changes which might affect the pursuance of a career in this field.

An individual is influenced by economic forces.

Self-Development

EVALUATION

The student should give a report about the job that is most appealing to him in the area of Agricultural Equipment and Mechanics. The tools and the education necessary to carry out the task of the particular occupation, as well as any special skills that are necessary should be taken into account. He should be able to tell if he would or would not like a job in this area and explain what skills, abilities, or limitations he presently has that would help or hinder him in entering this occupation. Included should be how the economy could affect his career and what plans he could make in anticipation of these changes. On the basis of past study and interviews, the student should be able to list and rate placement agencies located in his community.

RESOURCES

See "References for Additional Information" page.

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III. STUDENT ACTIVITIES

AGRICULTURAL EQUIPMENT AND MECHANICS

Power, Machinery, and Tools: The principal activities in this area deal with the gaining and using of knowledge and skills for the purchase, operation, and maintenance of agricultural equipment; selling, servicing, and repairing of agricultural equipment and parts; and the development or improvement of agricultural equipment.

OCCUPATION	D.O.T.
Ag. equipment dealer (manager)	183.118
Ag. equipment management consultant	184.118
Ag. equipment salesman	277.358
Ag. equipment parts manager	185.168
Ag. equipment parts man	285.358
Ag. engineer	013.081
Ag. equipment service manager	187.168
Ag. equipment service representative	638.281
Ag. equipment mechanic	624.281
Ag. equipment mechanics helper	624.381
Ag. equipment set-up man	624.381
Ag. equipment field and maintenance mechanic	624.381
Ag. equipment inspector and tester	624.381
Farm equipment operator	409.883

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a group or individual can list the ways that man uses power, machinery, and tools in agriculture. How does the economy influence this area of occupations? A notebook of observations should be kept. Included in it should be the locations where these specific types of jobs are available and particular materials and tools that are needed, as well as new vocabulary words encountered in the study. The individual could determine if he could accept himself as an employee in this occupational area of Agricultural Equipment and Mechanics.

1. Use the science book or resources in the library to find out about simple machines. Gather the materials necessary to set up a simple machine demonstration area. Demonstrate the operation of the six types of simple machines for interested class members. Tell how these machines are of use to the farmer and list some of the places he uses these machines.

2. Obtain some farm magazines and catalogues to aid in making a list of the different farm machines. Make a chart with the following headings: Soil Breakers, Chemical Applicators, Seed Planters, Crop Cutters, and Seed Separators. Arrange all of the machines listed under these headings.

3. Discuss in small groups the importance of safety while operating or repairing machines. Make a bulletin board showing some of the safety precautions required. Cartoon-type drawings could show unsafe practices.

4. Obtain a model engine kit and assemble it for a classroom display.

5. Visit a farm implement supply company and record the prices of several types of machinery. Visit a local farmer to find out which pieces he owns. Figure from a list of prices the approximate cost of the machinery on that farm if all were purchased new. Ask the farmer what portion of his total investment is for machinery and its maintenance.

6. View the instrument panel and the controls of a tractor or other self-propelled farm machine. Make a diagram of it, and study how to read and/or use it.

7. Bring to school some of the tools used by an agricultural mechanic and pictures of them. Make a display, labeling each tool. Find out the special skills needed to use unique tools. Give interested classmates an opportunity to handle and/or use some of the hand tools.

8. Draw and color or paint the emblem of the slow-moving vehicle (SMV).

9. Use pictures or models of early and modern equipment for a display. Prepare reading cards which tell how each originated and why they have changed.

10. Identify and list the variety of fuels used to operate agricultural machinery. Compare and/or contrast different kinds of energy sources and discuss the affects of possible fuel replacement on agricultural mechanics in terms of appearance and disappearance of jobs.

11. List the responsibilities of an agricultural mechanic. Indicate those responsibilities which seem to be major ones. Mark those that are unique to this occupation field.

12. Indicate on a large map of the United States the machines common to different geographical areas such as the grain combine in the Midwest, the cotton picker in the South, and the peanut harvestor in the East. Would an agricultural mechanic need to be familiar with machinery not needed in his area? Why or why not?

13. Select one of the Power, Machinery, and Tools occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

a. Special skills and aptitudes required
b. Education requirements
c. Working conditions and setting
d. Employment possibilities (sources of career placement information)

e. Affect of training and experience on his earning potential
f. Summer or seasonal job opportunities

14. Design a packet of materials which could introduce other students to the occupation chosen in the area of Power, Machinery, and Tools. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number thirteen could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered and to give additional information.

15. Compare the Power, Machinery, and Tools occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

AGRICULTURAL EQUIPMENT AND MECHANICS

Agricultural Structures: The principal activities in this area deal with the design, construction, and maintenance of agricultural structures.

OCCUPATION	D.O.T.
Farm building specialist - farmstead planner	096.128
Designing engineer	007.181
Rural carpenter	860.781
Farm building components salesman	276.358
Agricultural bldg. ventilation-insulation tech.	863.781

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a group or individual can list the ways that man uses agricultural structures. How does the economy influence this area of occupations? A notebook of observations should be kept. Included in it should be the locations where these specific types of jobs are available and the particular materials and tools that are needed, as well as new vocabulary words encountered in the study. The individual could determine if he could accept himself as an employee in this occupation area of Agricultural Equipment and Mechanics.

1. Identify and list those businesses in the community which employ people in agricultural construction jobs. The phone book or city directory will be of help in doing this.

2. Invite a representative of a local agricultural structure company to present a talk to the class about agricultural buildings. Discuss the advantages of different types of agricultural buildings with the class. Visit a construction site.

3. Obtain and examine some blueprints. Ask an architect to help in learning how to read them. Draw to scale a plan for a new farm building.

4. Visit a local farm to observe the size, shape, and other features of the buildings present. Tour each to see what purpose they serve. Be sure to learn the names given to each structure such as machine shed, silo, barn, grain bin, etc.

5. Gather materials to make a model farm including farm buildings. Papier-mache' on a board can be used for the ground. Paint and add buildings made from construction paper. Dried weeds, grasses, or pine cones make beautiful trees. Such things as ponds, fences, drives, etc. may be added.

6. Make drawings or models of the agricultural buildings needed by a variety of producers. Show, for example, how a cotton grower's needs would be different from a soybean or dairy farmer's needs.

7. Write to a company dealing with agricultural structures asking for literature about the types of materials used in farm buildings. Try to find out why certain materials are better for specific buildings than for others. Make a chart showing the different types of farm buildings, the best material for each, and why it is best. Pictures should be used to further illustrate the structures.

8. Examine farm buildings in the area to find out the types of construction and materials which are used. List these and describe them.

9. Select one of the Agricultural Structures occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

a. Special skills and aptitudes required
b. Educational requirements
c. Working conditions and setting
d. Employment possibilities (source of career placement information)
e. Affect of training and experience on his earning potential
f. Summer or seasonal job opportunities

10. Design a packet of materials which could introduce other students to the occupation chosen in the area of Agricultural Structures. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number nine could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered and to give additional information.

11. Compare the Agricultural Structures occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

AGRICULTURAL EQUIPMENT AND MECHANICS

Soil and Water Management: The principal activities in this area deal with designing and constructing water and soil management structures.

OCCUPATION	D.O.T.
Irrigation equipment operator	
Sprinkling	422.884
Standpipe	and
Valvepipe	422.887
Irrigation engineer	005.081
Soil scientist	040.081
Irrigation district manager	184.118
Soil biologist	041.081
Soil surveyor	040.081
Soil testing technician (lab tester)	029.181
Soil conservationist	040.081
Geologist	024.081
Biochemist	040.081
Heavy equipment operator	424.883
Soil conservation aide	040.081
Ag. engineer	013.081
Soil service manager (district supervisor)	040.081
Ag. engineer technician	013.181

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a group or individual can list the ways that man manages soil and water. How does the economy influence this area of occupations? A notebook of observations should be kept. Included in it should be the locations where these specific types of jobs are available and the particular materials and tools that are needed, as well as new vocabulary words encountered in the study. The individual could determine if he could accept himself as an employee in this occupational area of Agricultural Equipment and Mechanics.

1. Take a field trip to a site where someone is making alterations in the land for the purpose of improving the environment, for cultivation, or for other purposes. Find out what improvement the change will make and why it was decided that this change needed to be made.

2. Obtain a plat book from the county agricultural extension office. Learn how it is used, and try to identify some land locations in the area.

3. Contact a resource person (someone from the Soil Conservation Service Geological Survey or a local contractor) to demonstrate surveying activities. Ask him to assist in performing the following activities:

a. Focusing a transit on some distant object.
b. Placing rodmen at different points and determining elevations and reference points.
c. Computing differences in elevation.
d. Using a hand level and rod to determine slope.

4. Make a study of slopes of land and erosion. Do some experiments to demonstrate what happens to bare soil during rains if the slope is too extreme. Use several boxes of dry soil. Place one box flat, and place all others at different slopes. Using a sprinkling can, sprinkle equal amounts of water on each and observe runoff. Effects from a light rainfall and a downpour could be shown. Also, use one box of soil which has a dense stand of grass growing in it. Place it at the highest slope used previously and sprinkle water on it. Observe what happens.

5. Investigate through research or interviewing the ways in which a farmer can prevent soil erosion on his farm. Write a report about each of these methods describing them and telling why and when each is used. Draw a picture to illustrate each. Bind all reports into booklet form.

6. Read about drainage. Learn how proper drainage is managed and why it is important to plant and animal farmers. Dig up a small area of the school yard or use a large sand box to make a miniature drainage system. Show ditching, slope of land, etc.

7. Tour the school yard on a rainy day when water can be found standing on the lawn. Look over the entire area noting places that drain well and those that do not. Make suggestions for improved drainage.

8. Make a study of irrigation systems used in the state. Identify the need for irrigation, the types of irrigation systems, the different sources of water, and how the water is controlled.

9. Select one of the Soil and Water Management occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

a. Special skills and aptitudes required
b. Educational requirements
c. Working conditions and setting
d. Employment possibilities (source of career placement information)
e. Affect of training and experience on his earning potential
f. Summer or seasonal job opportunities

10. Design a packet of materials which could introduce other students to the occupation chosen in the area of Soil and Water Management. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number nine could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered and to give additional information.

11. Compare the Soil and Water Management occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

AGRICULTURAL EQUIPMENT AND MECHANICS

Electrification: The principal activities in this area deal with the gaining of knowledge of the principles of electricity and applying those principles as related to the design, operation, and maintenance of agricultural structures and equipment.

OCCUPATION	D.O.T.
Rural electrician	824.281
Rural electricians helper	824.281
Electrical safety technician (inspector)	168.284
Salesman, rural power (public utilities)	257.358

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a group or individual can list the ways that man uses electrification in agricultural businesses. How does the economy influence this area of occupations and its source of power? A notebook of observations should be kept. Included in it should be the locations where these specific types of jobs are available and the particular materials and tools that are needed, as well as new vocabulary words encountered in the study. This individual could determine if he could accept himself as an employee in this occupational area of Agricultural Equipment and Mechanics.

1. Research the history of electricity as it applies to agriculture. Give an illustrated talk to other class members. Identify the numerous ways electricity is now used on the farm and the affect it has had on increasing agricultural production and the processing of food products.

2. Make a list of some of the jobs that have been made available because of the invention of electricity. Mark the ones that are related to the field of agriculture. Make a "then and now" picture of how electricity has affected agricultural occupations.

3. Make two murals -- one showing life on the farm before electricity was invented and the other showing a modern farm with many electrical conveniences.

4. Investigate the sources of rural electricity. In view of an energy crisis, write a report telling some ways in which electricity can be conserved?

5. Write a news article entitled "All Electrical Power To Be Shut Off--What Will the Farmer Do?" Include in the article problems which would face the farmer and possible solutions for the problems.

6. Make a plan of a farm building or borrow the one made by students in the "Agricultural Structures" group. On the plan, show where all electrical switches, outlets, and fixtures are to be located. Be especially careful to put each in the most convenient location.

7. Make a study of electricity. Become familiar with the following terms and relate them to the agricultural use of electricity:

a. D.C. current
b. A.C. current
c. Conductor
d. Insulator
e. Watts
f. Volt
g. Ampere
h. Ohm
i. Ohm's Law
j. Horsepower
k. Kilowatt
l. Series circuit
m. Open circuit
n. Closed circuit
o. Parallel circuit
p. Generator

8. Complete some of the following activities after acquiring a working knowledge of electricity:

a. Wire a series or parallel circuit on a wiring board. Use a science book as a resource. Where could a parallel circuit be used?

b. Wire a simple switch and light circuit. Use a science book as a resource. Why would this skill be important to an electrician?

c. Obtain a simple generator from the science department and demonstrate how it works. How does a generator produce an electric current? When would an agricultural business have need of a generator?

9. Invite a representative from the Rural Electric Association to speak to the class about the training and interests required for work in this area. Have him compare his work and problems with those of urban workers.

10. Select one of the Electrification occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

a. Special skills and aptitudes required
b. Educational requirements
c. Working conditions and setting
d. Employment possibilities (source of career placement information)
e. Affect of training and experience on his earning potential
f. Summer or seasonal job opportunities

11. Design a packet of materials which could introduce other students to the occupation chosen in the area of Electrification. Include pictures

of people at their work, the equipment they use, and their work setting. Information gathered in activity number ten could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered and to give additional information.

12. Compare the Electrification occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

REFERENCES FOR ADDITIONAL INFORMATION

General:

Books

Burlingame, Roger. Machines that Built America. Harcourt, 1953.

Hunt, D. R. Farm Power and Machinery Management. Iowa State University Press, 1968.

Smith, R. L. Farm Machinery and Equipment. McGraw-Hill, 1964.

Farm Machinery Economic Decisions. Worksheets from Cooperative Extension Service, College of Agriculture, University of Illinois at Urbana, Illinois 61801.

Lumber Rigid Frames for Farm Buildings. University of Illinois, College of Agriculture, Extension Service, Urbana-Champaign, Illinois 61801.

Machinery Care and Safety. 4-H Tractor Program, National 4-H Service Committee, Chicago, Illinois, 1963.

Tractor 1, 2, 3, 4, Petroleum Power Program. 4-H Four Year Program on Tractor Care, University of Illinois, College of Agriculture, Cooperative Extension Service, Urbana, Illinois 61801.

Audio-Visuals

How Machines and Tools Help Us. David C. Cook, Texas Educational Aids. Film.

Outdoor Interest Occupations (side one); Mechanical Interest Occupations (side two). H. Wilson, 1967. Cassette.

Think Big. Vocational Agriculture Service, University of Illinois, Urbana, Illinois 61801. Filmstrip.

Organizations

Deere & Co., John Deere Road, Moline, Illinois 61265.

International Harvester Co., 401 N. Michigan Avenue, Chicago, Illinois 60611.

Sources of Specific Occupational Information:

Dictionary of Occupational Titles. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

Occupational Briefs. Chronicle Guidance Publications, Inc., Moravia, New York 13118.

Occupational Briefs. Largo Career Briefs, Largo, Florida.

Occupational Briefs. Science Research Associates, 259 E. Erie Street, Chicago, Illinois 60611.

Occupational Outlook Handbook. United States Department of Labor, Bureau of Statistics, Supt. of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

MAJOR CAREER DEVELOPMENT DIMENSION

COPING BEHAVIOR

AGRICULTURAL PRODUCTS (FOOD PROCESSING)

DAIRY PROCESSING MEAT PROCESSING

FRUITS, VEGETABLES, AND NUTS

OTHER PRODUCTS

BEFORE YOU BEGIN

For the convenience of both teacher and student, the materials in this study are divided into three sections. The last of these -- STUDENT ACTIVITIES -- is actually part of the second; it is presented as one piece, however, so that the teacher can easily lift it out, duplicate it, and distribute it to the class.

I. INSTRUCTIONAL INFORMATION

CAREER DEVELOPMENT CONCEPTS. These are the main concepts to be developed in this unit. The teacher should concentrate on the COPING BEHAVIOR subconcept *an individual should learn to cope with the rights and feelings of others*. This particular subconcept is appropriate for workers involved in AGRICULTURAL PRODUCTS (FOOD PROCESSING) because much of this work is performed by people working closely together in a factory-type situation. The other five interacting subconcepts further develop other understandings necessary for making career decisions.

INFUSED SUBJECT MATTER. This is a listing of some of the knowledge and skills acquired by this level of education. The subject matter is used in carrying out the student activities.

OCCUPATIONAL INFORMATION. For the benefit of the teacher, the several occupational areas with which the students are working in section three are also outlined here. Specific occupations in each of these areas are listed in the student section.

PUPIL PERFORMANCE OBJECTIVES. The teacher should consider these as the outcomes expected for the students by the end of the unit.

II. INSTRUCTIONAL ACTIVITIES

INTRODUCTORY ACTIVITIES. These are designed to interest the students in the subject matter of this unit, as well as to provide a controlled means of developing the career development concepts. The last of these activities should lead directly into . . .

INDIVIDUAL AND SMALL GROUP ACTIVITIES. On the basis of the last INTRODUCTORY ACTIVITY, the teacher should group the students into each occupational area and distribute to each group the information and activities for its chosen area. (See Section III below.) Students in each group can then choose which specific activities they would like to do. These activities are meant to give the student a few "hands-on" experiences with the kind of work encountered in the AGRICULTURAL PRODUCTS (FOOD PROCESSING) occupations. The teacher is free to develop additional activities which could add to the student's understanding of this unit.

CULMINATION ACTIVITIES. After each individual or small group has completed its activity, the students should be given a chance to

share their information. They may want to present their displays, give their reports, or exchange their career packets for a few days. The teacher should also use the CULMINATION ACTIVITIES suggested.

EVALUATION ACTIVITIES. Some evaluation experiences are provided for the unit. Rather than prescribe formal testing, the materials give a suggestion for evaluating the career development concepts. Because the classroom teacher is the best qualified evaluator in her classroom, she should decide HOW a given knowledge or skill shall be demonstrated and the QUALITY and QUANTITY of knowledge or skill required for a particular child or group of children.

III. STUDENT ACTIVITIES. These activities are to be used by each group and are in the preceding section.

The numbers listed to the right of each occupation are taken from The Dictionary of Occupational Titles (D.O.T.), Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

I. INSTRUCTIONAL INFORMATION

CAREER DEVELOPMENT CONCEPTS

COPING BEHAVIOR

Major Concept	Certain identifiable attitudes, values, and behaviors enable one to obtain, hold, and advance in a career.
Subconcept	*An individual should learn to cope with the rights and feelings of others.*

ATTITUDES AND APPRECIATIONS

Major Concept	Society is dependent upon the productive work of individuals.
Subconcept	*Most occupations include common expectations, such as punctuality, dependability, and avoidance of excessive absence.*

CAREER INFORMATION

Major Concept	Basic career information will aid in making career-related decisions.
Subconcept	*The individual worker determines which aspects of an occupation may be unpleasant or pleasant.*

EDUCATIONAL AWARENESS

Major Concept	Educational skills and experiences are related to the achievement of career goals.
Subconcept	*Learning achievement depends upon effort and ability.*

SKILL AWARENESS

Major Concept	All occupations require general and specific skills.
Subconcept	*All workers require skills to search for, locate, and obtain career placement on an initial basis and for advancement.*

ECONOMIC AWARENESS

Major Concept	Basic economic understandings will aid in making career-related decisions.
Subconcept	*Additional training and experience increase earning potential.*

INFUSED SUBJECT MATTER

Mathematics
  1. Comparison of prices
  2. Time

Language Arts
  1. Completion of sentences
  2. Role playing
  3. Report writing
  4. Research

Science
  1. Classification
  2. Preservation of food
  3. Making comparisons
  4. Pasteurizing

Social Studies
  1. Problem solving
  2. Economics
  3. Maps
  4. History

OCCUPATIONAL INFORMATION

Agricultural Products (Food Processing)

The location of the bulk of the processing industry in or close to production areas highlights the fact that food processing is essentially an agricultural industry. By converting the farmer's perishable crops into more usable form, the processing industry has eliminated the waste that would otherwise result from seasonal gluts and has made these perishable crops available to the consumer year-round.

Dairy Processing: The principal activities may be divided according to three general types of dairy plants. One type deals primarily with fluid milk and some fluid milk by-products. The second type of plant makes ice cream or ice cream mix. The third type manufactures butter, cheese, nonfat dry milk, condensed milk, or other products.

Meat Processing: The principal activities deal with slaughtering poultry, fish, and livestock; dressing, curing, processing, packaging, and canning meat; storing meat and meat products; and distributing and selling meat and meat products.

Fruits, Vegetables, and Nuts: The principal activities deal with washing the products; inspecting for foreign or damaged materials; trimming or peeling products; processing these products by canning, freezing, or drying; labeling; and distributing the product to the consumer.

Other Products: The principal activities deal with the processing of raw materials such as cotton, tobacco, wool, furs, or grain which are then sold to manufacturers to be made into a variety of finished products.

PUPIL PERFORMANCE OBJECTIVES

COPING BEHAVIOR

. . . role play the best and worst way to cope with the rights and feelings of a fellow worker.

. . . write a paragraph describing personal feelings toward borrowing and lending.

ATTITUDES AND APPRECIATIONS

. . . write a paragraph listing the affect of lateness, undependability, or excessive absence on the ability to complete and keep a job.

. . . list the attitudes of workers toward one who is punctual, dependable, and rarely absent. Also list the attitudes toward someone who is not punctual or dependable and is often absent.

CAREER INFORMATION

. . . identify those aspects of going to school which are pleasant and those which are unpleasant. Identify the factors which cause such feelings.

EDUCATIONAL AWARENESS

. . . evaluate one of the individual projects in terms of effort and ability.

SKILL AWARENESS

. . . identify skills needed to search, locate, and obtain career placement and advancement.

ECONOMIC AWARENESS

. . . prepare a graph which shows earning potential for a particular occupation commensurate with training and experience.

II. INSTRUCTIONAL ACTIVITIES

The instructional activities have been designed to develop the CAREER DEVELOPMENT CONCEPTS using a variety of subject matter, knowledge and skills, and appropriate occupational information. The teacher may develop additional activities which could add to the student's understanding of this unit.

INTRODUCTORY ACTIVITIES	CAREER DEVELOPMENT CONCEPTS
1. Have the students list the feelings they have toward themselves, fellow classmates, and parents. Discuss these attitudes. Are they common among others in the class?	*An individual should learn to cope with the rights and feelings of others.* **Coping Behavior**
2. Ask the class to complete the following open-end sentences: a. The way I feel about getting a job . . . b. A job is . . . c. I don't understand why people . . . d. Sometimes I don't understand why . . . e. I don't want people to . . . f. I want people to . . . g. Some things that cause fights or arguments . . .	*An individual should learn to cope with the rights and feelings of others.* **Coping Behavior**
3. Ask the students to role play an employer who must talk to an employee who has been absent or tardy too often.	*Most occupations include common expectations, such as punctuality, dependability, and avoidance of excessive absence.* **Attitudes and Appreciations**
4. Have the students list their successful school experiences. What caused them to achieve? Will these factors affect the achievement of career goals?	*Learning achievement depends upon effort and ability.* **Educational Awareness**
5. Invite an occupational counselor or guidance counselor to talk with the class concerning the skills required to search for, locate, and obtain career placement and advancement.	*All workers require skills to search for, locate, and obtain career placement on an initial basis and for advancement.* **Skill Awareness**
6. Place on a table a carton of milk, a box of frozen food, canned food, and dried food. Elicit from the students how these products were processed into a consumer product. Discuss how habits of workers affect the quality and price of products.	*Most occupations include common expectations, such as punctuality, dependability, and avoidance of excessive absence.* **Attitudes and Appreciations**

7. Have the students assess their interests.
General: I am interested in processing any food, in the way the food I eat is processed for the consumer, and in exploring ways to get the training and experience necessary to increase my earning potential.
Specific: I am interested in processing milk and its products; in processing, storing, and distributing meat; and in processing fruits, vegetables, or nuts.

Additional training and experience increase earning potential.
Economic Awareness

Use the assessment list developed in the last activity to help each student determine which of the areas listed below he would like to investigate.

SMALL GROUP OR INDIVIDUAL ACTIVITIES

See student pages:

Dairy Processing	- p. 99
Meat Processing	- p. 101
Fruits, Vegetables, and Nuts	- p. 103
Other Products	- p. 105

CULMINATION ACTIVITIES

1. Ask the class to list some of the common expectations required by employers for productive work. Individuals can write paragraphs explaining one of the expectations, emphasizing its importance.

Most occupations include common expectations, such as punctuality, dependability, and avoidance of excessive absence.
Attitudes and Appreciations

2. Have individuals role play via "Soap Box Forum." Select a problem such as borrowing or lending, or asking others to help get a job done and allow the students to give their views on solutions.

An individual should learn to cope with the rights and feelings of others.
Coping Behavior

3. Have the students list ways by which workers may increase their earnings.

Additional training and experience increase earning potential.
Economic Awareness

4. Have the students think back over their school experiences. Have they been tardy or absent? How has this affected their school work?

Most occupations include common expectations, such as punctuality, dependability, and avoidance of excessive absence.
Attitudes and Appreciations

5. Have the students classify their school jobs as those which are pleasant and those which are unpleasant. Does the final reward affect the acceptance of the unpleasant activities?

The individual worker determines which aspects of an occupation may be unpleasant or pleasant.

Career Information

6. Have the class list the factors they know have spurred adults on to achievement. Are any of these factors influencing their school achievement? Which factors will help them accomplish career goals?

All workers require skills to search for, locate, and obtain career placement on an initial basis and for advancement.

Skill Awareness

EVALUATION

Have each student write two short, true experiences -- one which records when someone made a compromise in consideration of the student's rights or feelings, and the second which shows when the student did something differently out of his concern for the rights or feelings of another person.

RESOURCES

See "References for Additional Information" page.

III. STUDENT ACTIVITIES

AGRICULTURAL PRODUCTS (FOOD PROCESSING)

Dairy Processing: The principal activities may be divided according to three general types of dairy plants. One type deals primarily with fluid milk and some fluid milk by-products. The second type of plant makes ice cream or ice cream mix. The third type manufactures butter, cheese, nonfat dry milk, condensed milk, or other products.

OCCUPATION	D.O.T.
Milk sampler	379.887
Clarifier	521.885
Batch freezer	523.885
Dairy-processing-equipment operator	529.782
Dairy-plant engineer	007.081
Dairy technologist	040.081
Dairy tester	469.381
Butter maker	529.782
Cheese maker	529.381

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a group or individual can note some situations when an employee must cope with the rights and feelings of other workers. Also, any times when punctuality, dependability, and attendance are of great importance can be noted.

1. Trace the route of a quart of milk from the cow to the refrigerator. Identify some of the occupations involved in the processing of this food. Find out if there are various levels of training experience and education required for the various positions. Record the findings in a written log or with picture illustrations.

2. Prepare a display of various containers of milk. Be sure to include dried and canned milk.

3. Prepare a chart of the many food items that are made from milk.

4. Prepare a report on milk. Some possible topics are Louis Pasteur; reasons for pasteurization; old and modern methods of pasteurizing milk; past, present, and future milk needs and products; or use of milk and milk products in other cultures.

5. Research and write a short theme concerning the importance of dairy products in our society.

6. Interview a plant manager to learn what he expects from his employees; i.e., punctuality, dependability, lack of absenteeism, and cooperation with fellow workers.

7. Prepare a display of methods of distributing milk to the customer. Include a drawing of a personal idea of milk distribution in the future.

8. Make a chart or display of different kinds of cheese. Prepare a card for each, including such information as country of origin, aging time, uses, and origin of shape and casing.

9. Plan a cheese tasting party. Have the students share varieties of cheese. Classify them into various categories.

10. Compare cow milk with goat or other animal milk. Why is milk called the perfect food? Why do different cultures use different kinds of milk or none at all?

11. Make a map locating the geographic areas which have many dairy farms. Find out why these farms are localized.

12. Select one of the dairy processing occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

a. Special skills and aptitudes required
b. Educational requirements
c. Working conditions and setting
d. Employment possibilities
e. Attitudes and values necessary to obtain, hold, and advance in his career.
f. Qualities necessary to be a productive worker

13. Design a packet of materials which could introduce other students to the occupation chosen in the area of dairy processing. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number twelve could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered to give additional information.

14. Compare the dairy processing occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

AGRICULTURAL PRODUCTS (FOOD PROCESSING)

Meat Processing: The principal activities deal with slaughtering poultry, fish, and livestock; dressing, curing, processing, packaging, and canning meat; storing meat and meat products; and distributing and selling meat and meat products.

OCCUPATION	D.O.T.
Offal man	521.884
Foreman, cured-meat packing	525.130
Meat inspector	316.884
Butcher	525.381
USDA inspector	168.287
Foreman, beef boning	525.131
Grader, meat	525.387
Final-dressing inspector	525.884
Animal eviscerator	525.887
Poultry dresser	525.887
Fish butcher	525.884

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a group or individual can note some situations when an employee must cope with the rights and feelings of other workers. Also, any times when punctuality, dependability, and attendance are of great importance can be noted.

1. Prepare charts which identify the carcass location of various cuts of meat. Identify the occupational difference of a slaughterer and a butcher.

2. Prepare a map showing beef, swine, sheep, and other animal producers in the U. S. Locate the major packing houses. Outline historically the moving of the animal from the producer to the packing house to consumer.

3. Prepare a report with pictures showing the use of animal parts which are not used for human food. What happens to the animal hides, tail, and squeal?

4. Display pictures of several ways meat is processed and packaged; i.e., frozen, canned, fresh, smoked. For each picture, prepare statements as to why each method is chosen.

5. Compare the methods used 50 years ago with those used today in processing poultry, fish, beef, swine, or sheep.

6. Research the history of meat processing. Is the geographical location changing? Why? Is the need for meat-packing workers decreasing? Why? What are current trends in the industry?

7. Find out and report to the class some of the health standards which must be met by meat, poultry, and fish packers. What is the purpose of inspecting meats? What does USDA mean on a side of beef?

8. List as many of the by-products of the meat packing industry as possible. What is the importance of these by-products to the industry?

9. Investigate possible ingredients of a meat product such as bologna. What are some differences between brands? Which products give the most protein for the money?

10. Prepare a chart showing the definitions of various grades of meat; i.e., prime, choice, etc.

11. Visit a kosher butcher shop, a Chinese market, or any food specialty shop to gain some first-hand information. Are there special ways of slaughtering and butchering meat, or processing other foods for certain cultural or religious groups?

12. Select one of the Meat Processing occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

a. Special skills and aptitudes required
b. Educational requirements
c. Working conditions and setting
d. Employment possibilities
e. Attitudes and values necessary to obtain, hold, and advance in his career
f. Qualities necessary to be a productive worker

13. Design a packet of materials which could introduce other students to the occupation chosen in the area of Meat Processing. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number twelve could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered to give additional information.

14. Compare the meat processing occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

AGRICULTURAL PRODUCTS (FOOD PROCESSING)

Fruits, Vegetables, and Nuts: The principal activities deal with washing the products; inspecting for foreign or damaged materials; trimming or peeling products; processing these products by canning, freezing, or drying; labeling; and distributing the product to the consumer.

OCCUPATION	D.O.T.
Washer, food products	529.887
Blancher operator	521.885
Redrying machine operator	523.132
Fruit-packaging-grader operator	920.885
Sorter, agricultural products	529.687
Cannery worker	529.886
Nut roaster	529.885
Peanut butter maker	529.885
Freezer man	523.887

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a group or individual can note some situations when an employee must cope with the rights and feelings of other workers. Also, any times when punctuality, dependability, and attendance would be of great importance can be noted.

1. Visit a canning factory to follow the process as an overview. Make a chart of the various jobs found in the factory.

2. Go to a local super market and list all of the types and styles of containers for fruits, vegetables, and nuts. Research these containers to learn the advantages of each. Make a display of each type with information available to the viewers concerning the purpose and value of each for different products.

3. Do mothers or home economics teachers preserve foods? What processes do they use? Talk with them and outline the stages for preserving different foods. Why is it necessary to follow established procedures?

4. Prepare a chart of one of the several ways of preserving foods -- canning, drying, freezing, smoking, and salting. Which method is used most often? Identify foods preserved by each method, and tell why that method is most frequently selected for that particular food.

5. Find out where the closest food processing plant is located. Find out what is done to help make the work atmosphere pleasant in the plant. What additional things could be done to improve conditions?

6. Investigate the importance of migrant workers in the food processing industry. What are some of the problems of these workers? How is modern technology affecting their job opportunities?

7. Observe the classroom at work. What behaviors do fellow classmates demonstrate that show ability to obtain, hold, and advance in a career; i.e., works well in a group, tries to find compromising answers, exhibits few biases, etc.

8. Conduct a food test. Select a vegetable or fruit which has been processed in at least three different ways, as well as fresh; i.e., canned, frozen, dried. Consider taste, color, texture, etc. Which type of preserving is best? Find out the occupations involved in preserving a favorite fruit or vegetable.

9. Phone a local place of business which has a time clock. Make arrangements for a demonstration of how a time clock operates and an explanation of its purpose. In the classroom, set up a simulation activity of punching a time card. Have members of a group or the class sign in on their time card the time of their arrival to and departure from class. At the end of the week, have each student figure his hours of attendance for that week. Assign an hourly wage to each classmate, and ask him to figure the amount of pay he should receive for that week if he were paid by the hour. Compare the weekly wages. How were students affected who were late to class or who forgot to sign in on their time card. Does punctuality and dependability affect others as well as the worker himself? How?

10. Select one of the Fruits, Vegetables, and Nuts occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

a. Special skills and aptitudes required
b. Educational requirements
c. Working conditions and setting
d. Employment possibilities
e. Attitudes and values necessary to obtain, hold, and advance in his career
f. Qualities necessary to be a productive worker

11. Design a packet of materials which could introduce other students to the occupation chosen in the area of Fruits, Vegetables, and Nuts. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number ten could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered to give additional information.

12. Compare the Fruits, Vegetables, and Nuts occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

AGRICULTURAL PRODUCTS (FOOD PROCESSING)

Other Products: The principal activities deal with the processing of raw materials such as cotton, tobacco, wool, furs, or grain which are then sold to manufacturers to be made into a variety of finished products.

OCCUPATION	D.O.T.
Washer, food products	529.887
Rice miller	521.138
Redrying machine operator (tobacco)	523.132
Drier (yeast)	529.885
Foreman, gelatin plant	559.137
Wheat cleaner (cereal) (bump-grader operator)	529.885
Foreman, maple products	529.138
Refining foreman (sugar)	529.130
Egg processing plant manager	412.137

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a group or individual can note some situations when an employee must cope with the rights and feelings of other workers. Also, any times when punctuality, dependability, and attendance would be of great importance can be noted.

1. List food products other than meat, dairy, vegetable, and fruit that are processed for human consumption. Identify their uses.

2. Choose one of the above food products and research the steps used in processing it from its raw state to market. Illustrate the process for display.

3. Recognize that many times food products are processed in a particular geographical location. If this is true of the chosen product, what people are involved in the processing? Are there any attitudes or behaviors that can be identified that are unique, or are they common to all working people?

4. Write some of the qualities of a productive individual. Tell why each is important and how one can achieve these qualities.

5. Make a chart showing the raw food product, the various stages of processing, and the final product. Why do some foods go through more stages than others?

6. List some aspects of work that make one feel more satisfied and productive other than the weekly pay check. What makes a job "just a job"?

7. Research the affect of the cotton gin on the cotton processing industry. Prepare a cotton display showing its progress from the raw product to cloth.

8. Prepare a guessing board using samples of wool, cotton, and synthetic fibers. On cards, give some information as to the use and origin of the fiber. How has the production of synthetic fibers affected the natural fiber farmer?

9. Display pictures of furs used for clothing. Identify the animals from which each fur comes. How is an animal fur farm different from other animal farms?

10. Prepare a scrapbook telling about grain products. Include cereals, macaroni, etc.

11. Make a "Did You Know" collage depicting the many products containing soybeans.

12. Select one of the Other Products occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

a. Special skills and aptitudes required
b. Educational requirements
c. Working conditions and setting
d. Employment possibilities
e. Attitudes and values necessary to obtain, hold, and advance in his career
f. Qualities necessary to be a productive worker

13. Design a packet of materials which could introduce other students to the occupation chosen in the area of Other Products. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number twelve could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered to give additional information.

14. Compare the Other Products occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

REFERENCES FOR ADDITIONAL INFORMATION

General:

Books

Sacharow, Stanley and Griffin, Roger C. Food Packaging. AVI Publishing Co., Box 670, Westport, Connecticut 06880. 1970.

The Almanac of the Canning, Freezing, Preserving Industries. Edward E. Judge & Sons, 79 Bond Street, Westminster, Maryland 21157. 1970

Dairy Processing:

Books

Arbuckle, Wendell S. Ice Cream. AVI Publishing Co., Box 670, Westport, Connecticut 06880. 1966.

Hall, Carl W. and Hedrick, Theodore I. Drying of Milk and Milk Products. AVI publishing Co., Box 670, Westport, Connecticut 06880. 1966.

Organizations

American Dairy Association, 20 North Wacker Drive, Chicago 6, Illinois.

Meat Processing:

Books

Brandly, Paul J.; Migaki, George; and Taylor, Kenneth. Meat Hygiene. Lea & Febiger, 600 S. Washington Square, Philadelphia, Pa. 19106. 1966.

Buehr, Walter. Meat from Ranch to Table. William Morrow & Co., Inc., 105 Madison Avenue, New York, N. Y. 10016. 1956.

Levie, Albert. The Meat Handbook. AVI Publishing Co., Box 670, Westport, Connecticut 06880. 1970.

Mountney, George S. Poultry Products Technology. AVI Publishing Co., Box 670, Westport, Connecticut 06880. 1966.

Stansby, Maurice E. Industrial Fishery Technology. Van Nostrand Reinhold Co., 450 West 33rd Street, New York, N. Y. 10001. 1963.

Audio-Visuals

Food from the Sea. Bailey Film Associates. film.

Organizations

Amalgamated Meat Cutters & Butchers, Workmen of North America, 2800 Sheridan Road, Chicago, Illinois.

United Packinghouse Workers of America, 608 South Dearborn Street, Chicago, Illinois.

Fruits, Vegetables, and Nuts:

Books

Talburt, William F. and Smith, Ora. Potato Processing. AVI Publishing Co., Box 670, Westport, Connecticut 06880. 1967.

Tressler, Donald K. and Evers, Clifford F. The Freezing Preservation of Foods. AVI Publishing Co., Box 670, Westport, Connecticut 06880. 1968.

Wise, William. Fresh, Canned and Frozen Food from Past to Future. Parents Magazine Press,

Organizations

National Canners Association, 1133 - 20th Street, N. W., Washington, D. C. 20036.

Other Products:

Books

Kent, Norman L. Technology of Cereals with Special Reference to Wheat. Pergamon Press, Inc., Maxwell House, Fairview Park, Elmsford, N. Y. 10523. 1966.

Jacobs, Morris B. Carbonated Beverages. Chemical Publishing Co., Inc., 200 Park Avenue S., New York, N. Y. 10003. 1959.

Minifie, Bernard W. Chocolate, Cocoa and Confectionery : Science & Technology. AVI Publishing Co., Box 670, Westport, Connecticut 06880. 1970.

Sources of Specific Occupational Information:

Dictionary of Occupational Titles. Superintendent of Documents, U. S. Government Printing Office, Wasnington, D. C. 20402.

Occupational Briefs. Chronicle Guidance Publications, Inc., Moravia, N. Y. 13118.

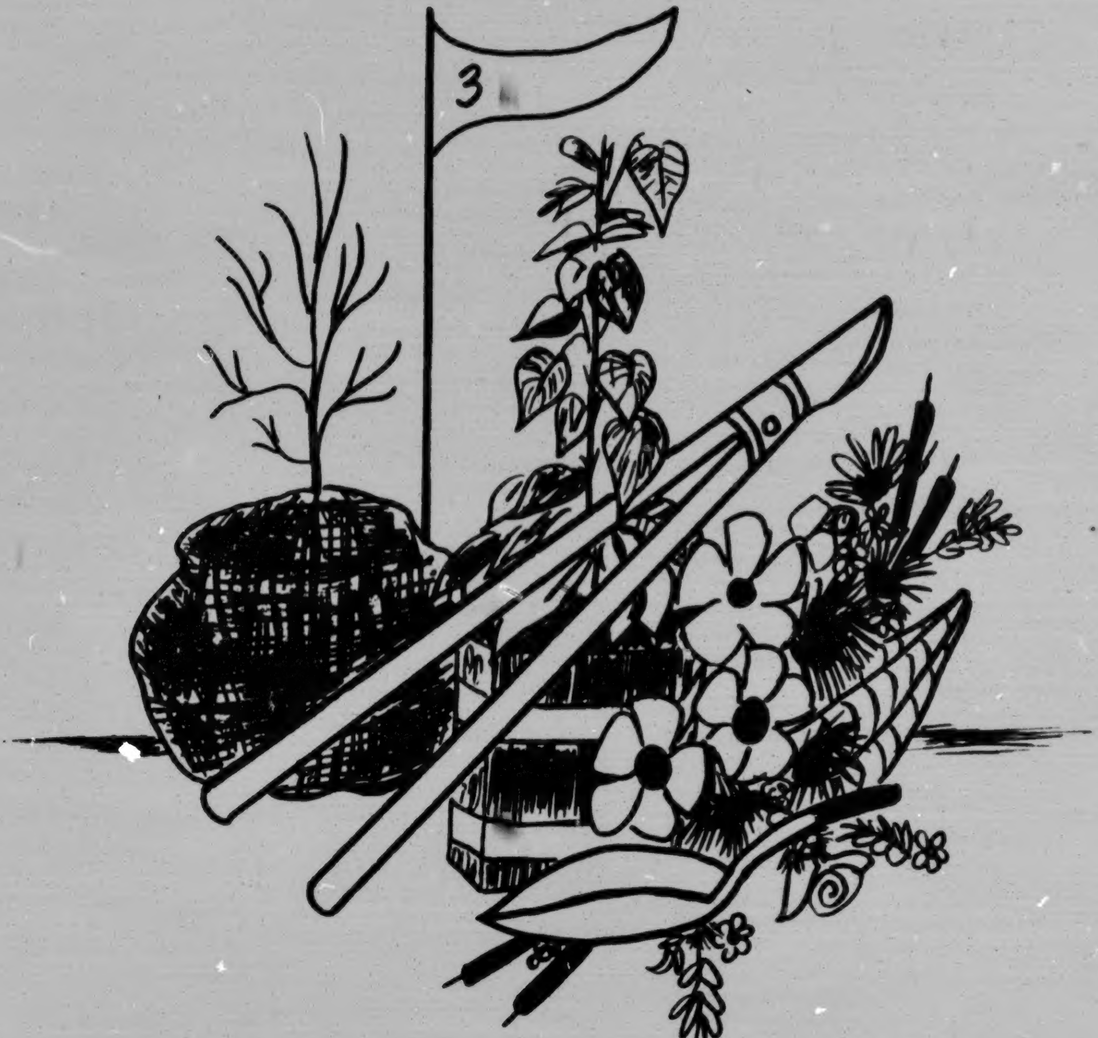
Occupational Briefs. Largo Career Briefs, Largo, Florida.

Occupational Briefs. Science Research Associates, 259 E. Erie Street, Chicago, Illinois 60611.

Occupational Outlook Handbook. United States Department of Labor, Bureau of Statistics, Supt. of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

MAJOR CAREER DEVELOPMENT DIMENSION

SELF-DEVELOPMENT



ORNAMENTAL HORTICULTURE

ARBORICULTURE FLORICULTURE LANDSCAPING

GREENHOUSE OPERATION AND MANAGEMENT

NURSERY OPERATION AND MANAGEMENT

TURF MANAGEMENT

BEFORE YOU BEGIN

For the convenience of both teacher and student, the materials in this study are divided into three sections. The last of these -- STUDENT ACTIVITIES -- is actually part of the second; it is presented as one piece, however, so that the teacher can easily lift it out, duplicate it, and distribute it to the class.

I. INSTRUCTIONAL INFORMATION

CAREER DEVELOPMENT CONCEPTS. These are the main concepts to be developed in this unit. The teacher should concentrate especially on the SELF-DEVELOPMENT subconcept *there is a relationship between an individual's knowledge and acceptance of self and his career preference.* This particular concept seems appropriate to the study of ORNAMENTAL HORTICULTURE occupations. The student needs to know if he has the artistic ability for design, the agricultural knowledge for growing plants, the business ability possibly to operate his own business, and the ability to serve other people. The other five interacting subconcepts further develop other understandings necessary for making career decisions.

INFUSED SUBJECT MATTER. This is a listing of some of the knowledge and skills acquired by this level of education. The subject matter is used in carrying out the student activities.

OCCUPATIONAL INFORMATION. For the benefit of the teacher, the several occupational areas with which the students are working in section three are also outlined here. Specific occupations in each of these areas are listed in the student section.

PUPIL PERFORMANCE OBJECTIVES. The teacher should consider these as the outcomes expected for the students by the end of the unit.

II. INSTRUCTIONAL ACTIVITIES

INTRODUCTORY ACTIVITIES. These are designed to interest the students in the subject matter of this unit, as well as to provide a controlled means of developing the career development concepts. The last of these activities should lead directly into . . .

INDIVIDUAL AND SMALL GROUP ACTIVITIES. On the basis of the last INTRODUCTORY ACTIVITY, the teacher should group the students into each occupational area and distribute to each group the information and activities for its chosen area. (See Section III below.) Students in each group can then choose which specific activities they would like to do. These activities are meant to give the student a few "hands-on" experiences with the kind of work encountered in the ORNAMENTAL HORTICULTURE occupations. The teacher is free to develop additional activities which could add to the student's understanding of this unit.

CULMINATION ACTIVITIES. After each individual or small group has completed its activity, the students should be given a chance to share their information. They may want to present their displays, give their reports, or exchange their career packets for a few days. The teacher should also use the CULMINATION ACTIVITIES suggested.

EVALUATION ACTIVITIES. Some evaluation experiences are provided for the unit. Rather than prescribe formal testing, the materials give a suggestion for evaluating the career development concepts. Because the classroom teacher is the best qualified evaluator in her classroom, she should decide HOW a given knowledge or skill shall be demonstrated and the QUALITY and QUANTITY of knowledge or skill required for a particular child or group of children.

III. STUDENT ACTIVITIES. These activities are to be used by each group and are in the preceding section.

The numbers listed to the right of each occupation are taken from The Dictionary of Occupational Titles (D.O.T.), Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

I. INSTRUCTIONAL INFORMATION

CAREER DEVELOPMENT CONCEPTS

SELF-DEVELOPMENT

Major Concept	An understanding and acceptance of self is important.
Subconcept	*There is a relationship between an individual's knowledge and acceptance of self and his career preference.*

CAREER INFORMATION

Major Concept	Basic career information will aid in making career-related decisions.
Subconcept	*Occupations have their own work settings.*

EDUCATIONAL AWARENESS

Major Concept	Educational skills and experiences are related to the achievement of career goals.
Subconcept	*Learning is a lifelong process.*

ATTITUDES AND APPRECIATIONS

Major Concept	Society is dependent upon the productive work of individuals.
Subconcept	*A great many tasks can be performed by men or women.*

SKILL AWARENESS

Major Concept	All occupations require general and specific skills.
Subconcept	*Most occupations require skills and knowledge in communications, mathematics, organization, and/or problem solving.*

ECONOMIC AWARENESS

Major Concept	Basic economic understandings will aid in making career-related decisions.
Subconcept	*Work is a means of gaining societal rewards.*

INFUSED SUBJECT MATTER

- Mathematics
  1. Measurements
  2. Percent
  3. Cost
  4. Area
- Language Arts
  1. Research skills
  2. Presentations
  3. Discussion
  4. Interviews
  5. Dictionary skills
- Science
  1. Genetics
  2. Scientific nomenclature
  3. Classification
  4. Scale drawings
  5. Plant identification
- Social Studies
  1. Map skills
  2. Geography

OCCUPATIONAL INFORMATION

Ornamental Horticulture

Ornamental Horticulture deals with the culture, production, and maintenance of plants; the establishment, maintenance, and management of Ornamental Horticulture enterprises; the principles and practices involved in locating, planting, and maintaining turf, plants, and shrubs; and the selection and placement of nonliving materials for the beautification of the indoor and outdoor environment.

Arboriculture: The principal activities in this field deal with the cultivation and maintenance of trees and shrubs especially for ornamentation.

Floriculture: The principal activities in this field deal with the cultivation and management of ornamental and flowering plants.

Green House Operation and Management: The principal activities in this field deal with the management and operation of an enclosure for the protection and cultivation of plants.

Landscaping: The principal activity in this field deals with rearranging and modifying the effects of natural scenery over a tract of land for aesthetic effect.

Nursery Operation and Management: The principal activities in this field deal with the growing, developing, and marketing of trees, shrubs, and other ornamental plants for the beautification and improvement of our environment.

Turf Management: The principal activities in this field deal with the management and growth of grasses to be used for turf.

PUPIL PERFORMANCE ACTIVITIES

SELF-DEVELOPMENT

. . . list some of the work habits needed to hold a job and match them to the individual's work habits.

. . . identify any skills or knowledge the student has which would be of importance in an ornamental horticulture career.

CAREER INFORMATION

. . . explain why a person working in an ornamental horticulture occupation would enjoy his job more if he liked being out-of-doors and working with plants and people.

EDUCATIONAL AWARENESS

. . . list three good sources which a person could consult to find information used in the area of ornamental horticulture.

. . . tell how an interest or hobby developed at any life stage could be of great help to a person in selecting an occupation.

ATTITUDES AND APPRECIATIONS

. . . demonstrate through role playing that both men and women have some of the skills needed to work in the field of ornamental horticulture.

SKILL AWARENESS

. . . list some subject skills which are learned in school and are used by a worker in an ornamental horticulture occupation.

ECONOMIC AWARENESS

. . . state reasons why there is now a greater demand for workers in the ornamental horticulture field than there was thirty years ago and tell how financial gains of the worker have been affected.

II. INSTRUCTIONAL ACTIVITIES

The instructional activities have been designed to develop the CAREER DEVELOPMENT CONCEPTS using a variety of subject matter, knowledge and skills, and appropriate occupational information. The teacher may develop additional activities which could add to the student's understanding of this unit.

INTRODUCTORY ACTIVITIES	CAREER DEVELOPMENT CONCEPTS
1. Take a field trip to observe ornamental horticulture workers on the job. Ask them to explain how their interests and abilities help them in their particular occupation. Ask if they are still learning new techniques and types of products to use in their business.	*Occupations have their own work settings.* Career Information *Learning is a lifelong process.* Educational Awareness
2. Show the class the filmstrip and tape set entitled "Choosing a Career in Ornamental Horticulture." Distribute the brochures entitled "We Want You - Ornamental Horticulture," which come with the filmstrip and tape set. With the class, list occupations in the field of ornamental horticulture. Beside each occupation list the skills and knowledge in communications, mathematics, organization, and problem solving that might be needed in that job.	*Most occupations require skills and knowledge in communications, mathematics, organization, and/or problem solving.* Skill Awareness
3. Have the students divide into small groups. Go through the want ads of the local newspaper and find positions which are related to ornamental horticulture. Do the ads state whether men or women are desired for the positions? If so, why is this done? Should it be done?	*A great many tasks can be performed by men or women.* Attitudes and Appreciations
4. Discuss the concept of self-development with the class as it relates to career information. Do they know themselves? How could they prepare themselves for an occupation in this field?	*There is a relationship between an individual's knowledge and acceptance of self and his career preference.* Self-Development

5. Discuss with the students how they can improve their environment using interests which relate to the field of ornamental horticulture. Do they think workers in this field help society? How? What rewards might they receive?

Work is a means of gaining societal rewards.

Economic Awareness

6. Have the students assess their likes and dislikes in the following manner. I am interested in cultivating and caring for trees and shrubs; growing and caring for flowers and designing arrangements for specific occasions; working in an enclosed structure; growing, cultivating, and selling plants for use in landscaping homes or public places; improving and modifying the effects of natural habitats by designing or planting trees, shrubs, or flowers; growing, developing, and marketing trees, shrubs, or other ornamental plants for sale; management and growth of grasses to be used for turf.

Occupations have their own work settings.

Career Information

Use the assessment list developed in the last activity to help each student determine which of the areas listed below he would like to investigate.

SMALL GROUP OR INDIVIDUAL ACTIVITIES

See student pages:

Arboriculture	- p. 121
Floriculture	- p. 123
Green House Operation and Management	- p. 125
Landscaping	- p. 127
Nursery Operation and Management	- p. 129
Turf Management	- p. 131

CULMINATION ACTIVITIES

1. Let the students play the game of "Twenty Questions." One person thinks of an occupation and begins by giving a general clue as to what that occupation is. The class members ask questions that can be answered "yes" or "no" until they discover the correct occupation. After one game, discuss the ways in which the students found the answers.

Most occupations require skills and knowledge in communications, mathematics, organization, and/or problem solving.

Skill Awareness

Have them note how much easier it is to guess the correct occupation when they all contribute ideas than it is when only one person asks questions and does all of the guessing. Point out the benefit of knowledge of skills and interests necessary for specific occupations.

2. Have the students list all of the personal qualities which they feel are necessary in a particular ornamental horticulture occupation. On another paper, have them list all of the personal qualities which they feel they possess. As they match the two lists, ask them to make conclusions as to what their success might be in that particular occupation.

There is a relationship between an individual's knowledge and acceptance of self and his career preference.

Self-Development

3. Have the students write a magazine article entitled "What's New in Ornamental Horticulture?" explaining some of the newer methods and equipment and giving reasons for the change to the newer methods.

Learning is a lifelong process.

Educational Awareness

EVALUATION

Have the students list three Ornamental Horticulture occupations which would require activities or skills in each of the following areas:

a) working outdoors
b) working with plants
c) selling
d) helping others
e) working with mechanical things
f) helping improve the environment
g) using artistic ability
h) doing research work

Have each student report to the class or write out a general job description, personal and educational requirements, and job requirements for an occupation in Ornamental Horticulture. Have each student mark the occupation he is most interested in and tell why. Have him tell what financial or other societal rewards that occupation might provide. Have him write a resume' about himself providing the information needed if he were applying for the job. Make sure he lists hobbies and interests that would make him particularly valuable in this field.

RESOURCES

See "References for Additional Information" page.

III. STUDENT ACTIVITIES

ORNAMENTAL HORTICULTURE

Arboriculture: The principal activities in this field deal with the cultivation and maintenance of trees and shrubs especially for ornamentation.

OCCUPATION	D.O.T.
Arborist	040.181
Tree surgeon	409.181
Arboretum foreman	407.138
Park foreman	407.134
Arboretum worker	404.884
Tree service department manager	187.168
Tree pruner	404.884
Tree girdler	465.887
Tree budder	406.887
Tree planter	406.887
Tree service proprietor	406.168
Tree sprayer	424.883
Tree remover	407.884
Tree climber	449.884
Tree surgeon helper	409.884

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a group or individual can list the interests, skills, aptitudes, values, and achievements that are of benefit in the pursuit of a career in arboriculture. A notebook of observations should be kept which should include the locations where this type of work is available. The particular tools needed should be recorded, as well as the new vocabulary words encountered. The individual could determine if he could accept himself as an arboriculturist in view of what is learned in this unit.

1. Make a list of businesses in town that specialize in arboricultural supplies. Use the yellow pages of the telephone book for reference.

2. Make a chart showing definitions of the following words which are connected with a career in arboriculture: cultivation, ornamental, arbor, arboriculturist, pruning, cabling, and arboretum. Use pictures to illustrate the words when possible.

3. Make a display of the tools necessary for a particular operation in the field of arboriculture.

4. Force branches of spring flowering trees and shrubs to bloom or leaf. See the science teacher to find out how this is done.

5. Make cuttings from the shrubs around home or the school. Cut from the rear of the plants, making sure to include new and old growth. Remove

leaves from old wood and place in water. After root systems form, plant cuttings using peat moss, sand, and top soil.

6. Take an investigative walk around the school yard and observe the kinds of trees and their shapes and sizes. Do they need to be pruned? Are there any insects on the leaves or bark? Do they need to be braced? Are they young or old?

7. Select one of the arboriculture occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

a. Special skills and aptitudes required
b. Educational requirements
c. Working conditions and setting
d. Employment possibilities
e. Personal qualifications for job
f. Related interests of interviewee which may have affected his career choice
g. Summer or seasonal job opportunities

8. Design a packet of materials which could introduce other students to the occupation chosen in the area of arboriculture. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number seven could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered to give additional information.

9. Compare the arboriculture occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

ORNAMENTAL HORTICULTURE

Floriculture: The principal activities in this field deal with the cultivation and management of ornamental and flowering plants.

OCCUPATION	D.O.T.
Florist (wholesale)	260.458
Retail florist	260.458
Production manager	181.118
Flower shop manager	185.168
Floral designer	142.081
Flower grower	406.181
Greenhouse employee	406.887
Plant pathologist	041.081

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a group or individual can list the interests, skills, aptitudes, values, and achievements that are of benefit in pursuit of a career in floriculture. A notebook of observations should be kept and should include the locations where this type of work is available and the particular tools necessary, as well as the vocabulary words encountered. The individual could determine if he can accept himself as a floriculturist in view of what is learned in this unit.

1. Visit different florist shops in the area. Find out how the employees became interested in floriculture. Share the results with fellow students.

2. Make a chart defining the following words and abbreviations: floriculture, F.T.D., cultivate, florist, wholesale, and retail. Use pictures to illustrate the words when possible.

3. Investigate the market for the use of flowers in the United States by using one of the following activities:

   a. Use magazine pictures to make posters showing uses of flowers.
   b. List the special occasions when people send fresh flowers. When are artificial flowers sent?
   c. Relate personal experiences for the use of flowers.
   d. Visit local florist shops or greenhouses and ask questions of the manager concerning the most often used flowers and the purpose for which they are used.

4. Design a floral arrangement for the school cafeteria. Make certain the flowers fit the season. Materials needed are container, artificial or live flowers, and the book on flower arranging referred to in "References." Items such as needle holders, pruning shears, wire clippers, wire (florist and chicken), modeling clay, and rubber bands may be useful.

5. Plant a terrarium. Ask the science teacher for information if necessary.

6. Plant seeds of ornamental flowers and cultivate them for the future planting on the school grounds. If possible, set up a florist shop at a P.T.A. meeting and sell plants for some specific school project. Materials needed are seeds, media for plantings, and styrofoam cups or other containers.

7. Design and plant a dish landscape. Use bonsai trees, dwarf plants, or cactus.

8. Role play a clerk with a customer ordering flowers. What would he need to ask and what would be needed to know to answer him?

9. Make a chart showing the cost of a variety of floral arrangements using the Florist Telegraph Delivery Service Brochure available from a local florist.

10. Obtain a common plant such as a daisy, zinnia, or marigold. Mount the plant on a piece of cardboard or plywood with tape, wire, or staples. Label each part and describe its function on the display board.

11. Select one of the floriculture occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

  a. Special skills and aptitudes required
  b. Educational requirements
  c. Working conditions and setting
  d. Employment possibilities
  e. Personal qualifications for job
  f. Related interests of interviewee which may have affected his career choice
  g. Summer or seasonal job opportunities

12. Design a packet of materials which could introduce other students to the occupation chosen in the area of floriculture. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number eleven could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered and to give additional information.

13. Compare the floriculture occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

ORNAMENTAL HORTICULTURE

Greenhouse Operation and Management: The principal activities in this field deal with the management and operation of an enclosure for the protection and cultivation of plants.

OCCUPATION	D.O.T.
Greenhouse employee	406.887
Plant propagator	406.168
Plant geneticist	041.081
Flower grower	406.181
Greenhouse manager	406.168

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a student or group can list the interests, skills, aptitudes, values, and achievements that are of benefit to a person in pursuit of a career in Greenhouse Operation and Management. A notebook of observations should be kept and should include the locations where this type of work is available. Recorded, also, should be the particular tools necessary, as well as the new vocabulary words encountered. The individual could determine if he could accept himself as a greenhouse operator and manager in view of what is learned in this unit.

1. Obtain soil from four different areas. Plant seeds of the same variety in each of these planting medias. Expose to the same conditions: water, temperature, air, and sunlight, and record observable differences over a three- or four-week period. Decide which media is best and tell why.

2. Make a display of the various ways that plants might be propagated and give the reasons each might be beneficial to the greenhouse operator.

3. Write a paper on the importance of using scientific names for plant identification. Why are they more useful than common names?

4. Visit a greenhouse. Ask the greenhouse operator to show some low ground cover. Suggest places ground cover would be useful.

5. Give a group demonstration on making a compost heap. Point out the value of compost in the cultivation of gardens and flower beds.

6. Design a greenhouse to be used by an individual hobbyist to grow special plants.

7. Place a potted plant out of sunlight in a dark room for a few days. Observe the changes in growth and leaf color caused by a lack of sunlight.

8. Use materials relating to greenhouse operation and management to decorate a showcase in the school.

9. Develop a notebook on ornamental flowers found in the area. Place a sample leaf or flower from each of the plants on a page (cellophane tape may be used to attach the leaves to the page). Give the scientific and common name of each and any information which may be used to identify the plant.

10. Select one of the greenhouse operation and management occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

a. Special skills and aptitudes required
b. Educational requirements
c. Working conditions and setting
d. Employment possibilities
e. Personal qualifications for job
f. Related interests of interviewee which may have affected his career choice
g. Summer or seasonal job opportunities

11. Design a packet of materials which could introduce other students to the occupation chosen in the area of greenhouse operation and management. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number ten could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered and to give additional information.

12. Compare the chosen occupation in greenhouse operation and management with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

ORNAMENTAL HORTICULTURE

Landscaping: The principal activity in this field deals with rearranging and modifying the effects of natural scenery over a tract of land for aesthetic effect.

OCCUPATION	D.O.T.
Landscape draftsman	019.188
Landscape architect	019.081
Landscape maintenance superintendent	407.138
Landscape contractor	407.181
Cemetery superintendent	407.887
Landscape nurseryman	406.168
Park or parkway superintendent	407.868
Landscape maintenance foreman	407.181
Landscape installation foreman	407.181
Parkway maintenance foreman	407.134
Landscape salesman	261.158
Landscape gardener	407.181
Park laborer	407.887
Campground landscaper	019.081
Landscape consultant	407.181
Landscape aid	407.181

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a student or group can list the interests, skills, aptitudes, values, and achievements that are of benefit to a person in pursuit of a career in landscaping. A notebook of observations should be kept and should include locations where this type of work is available. Recorded, also, should be the particular tools necessary, as well as the new vocabulary words encountered. The individual could determine if he could accept himself as a landscaper in view of what is learned in this unit.

1. Visit a new building before and after landscaping. Note the differences and discuss the improvements.

2. Prepare a landscape architect's portfolio for use with a future customer. Include before and after photographs of a building with landscape improvements; kinds of materials available; sketches of alternate landscaping plans; suggestions for ornamental plants, as well as walls, gardens, pools, fences, and other nonliving ornamental decorations. Present this portfolio to the class.

3. Tour the school grounds with the groundskeeper and find the necessary tasks involved in landscaping and caring for the school grounds.

4. Use pictures from magazines to make various kinds of gardens on poster paper such as Japanese, tropical, English. Use "house and garden" type magazines for illustrations.

5. Analyze the prices quoted in the newspaper or nursery catalogue for several varieties of plants used for ornamentation. Set up a budget for the landscaping of a new house in the area using these figures.

6. Visit a landscaping operation and talk with the people who are in charge of planning landscaping projects. Ask the landscaper to explain what is necessary to know when grouping certain plants together.

7. Design a bulletin board showing all the different buildings in the area that might require the services of a landscape architect -- hospital, city buildings, schools, playgrounds, apartment buildings, shopping centers, parks, etc.

8. Design a waterfall or sculpture to be used as part of a landscaped garden.

9. Make a drawing of the school building (use the school floor plan from the Student Handbook). Mark on the drawing the location of the trees, vines, and shrubs. Describe the plantings, giving them shape, size, height, etc. Make a list of the people involved in the various jobs that would be necessary for the development and maintenance of the entire landscaping plan.

10. Select one of the landscaping occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

    a. Special skills and aptitudes required
    b. Educational requirements
    c. Working conditions and setting
    d. Employment possibilities
    e. Personal qualifications for job
    f. Related interests of interviewee which may have affected his career choice
    g. Summer or seasonal job opportunities

11. Design a packet of materials which could introduce other students to the occupation of your choice in the area of Landscaping. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number ten could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered and to give additional information.

12. Compare the occupation chosen in Landscaping with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

ORNAMENTAL HORTICULTURE

Nursery Operation and Management: The principal activities in this field deal with the growing, developing, and marketing of trees, shrubs, and other ornamental plants for the beautification and improvement of our environment.

OCCUPATION	D.O.T.
General manager - nursery	406.168
Nursery production manager	180.168
Nursery foreman	407.138
Nursery salesman	277.358
Nurseryman	406.168
Nursery sales agent	298.158
Nursery stock jobber	406.168
Nursery worker	406.887
Nursery grower	406.168
Plant pathologist	041.081
Plant geneticist	041.081

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a student or group can list the interests, skills, aptitudes, values, and achievements that are of benefit to a person in pursuit of a career in Nursery Operation and Management. A notebook of observations should be kept which should include locations where this type of work is available. Recorded, also, should be the particular tools necessary, as well as the new vocabulary words encountered. The individual could determine if he could accept himself as a nursery operator or manager in view of what is learned in this unit.

1. Collect and identify plant-growing media. Tell what type is necessary to grow particular ornamental plants.

2. Use the telephone directory and make a list of businesses that specialize in nursery plants. Identify the specialties of each of these businesses.

3. Visit a nursery to get information on such things as preparing the soil for planting, planting and caring for seedlings and saplings, propagating plants in a nursery, caring for trees in winter, and grafting. Obtain a guide on how to plant and care for plants from a garden catalogue company. Using the guide and information gathered at the nursery, try some of the following:

   a. Obtain a cutting from a shrub and start a new plant (grapevine cuttings are easily started). Let it root, then plant and care for it according to specifications previously learned.

   b. Wrap a tree to protect it in winter.
   c. Try grafting with the help of someone experienced in grafting.

4. Obtain a garden catalog. Make a bulletin board display by cutting pictures from the catalogue of the various flowering shrubs and trees. Label each variety. During the flowering season, try to identify the flowering trees and shrubs in the area by examining the blossoms.

5. Obtain an illustrated key to identify shrubs and trees. Using the guide, key some of the shrubs and trees in the school yard or neighborhood. Tag them for the benefit of classmates who might like to try keying.

6. Describe some of the duties performed by one who works in a nursery. Describe the work setting in which each duty is performed.

7. Make a display of the tools necessary for a particular nursery operation.

8. Make a crossword puzzle using the terms from the occupational area of nursery operation and management. Duplicate it and ask classmates to work it out.

9. Discuss a group project to make enough money to pay for an ornamental plant. After obtaining the money, order the plant from a garden catalog company. When the plant arrives, note how it was pruned and packed for mailing. Plant it in the school yard, using the accompanying instructions or using knowledge learned in previous activities.

10. Select one of the nursery operation and management occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

   a. Special skills and aptitudes required
   b. Educational requirements
   c. Working conditions and setting
   d. Employment possibilities
   e. Personal qualifications for job
   f. Related interests of interviewee which may have affected his career choice
   g. Summer or seasonal job opportunities

11. Design a packet of materials which could introduce other students to the occupation chosen in the area of nursery operation and management. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number ten could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered and to give additional information.

12. Compare the chosen occupation in Nursery Operation and Management with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

ORNAMENTAL HORTICULTURE

Turf Management: The principal activities in this field deal with the management and growth of grasses to be used for turf.

OCCUPATION	D.O.T.
Golf course superintendent	407.138
Turf production manager	180.168
Grounds superintendent	407.138
Turf research and development technician	040.081
Golf course installation foreman	407.883
Turf grass maintenance foreman	899.133
Park, parkway or golf course foreman	407.134
Sod salesman	277.358
Grounds maintenance employee	407.884
Greenskeeper	407.137
Sod layer	406.887

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a student or group can list the interests, skills, aptitudes, values, and achievements that are of benefit to a person in pursuit of a career in Turf Management. A notebook of observations should be kept which should include locations where this type of work is available. Recorded, also, should be the particular tools necessary, as well as the new vocabulary words encountered. The individual could determine if he could accept himself as a turf manager in view of what is learned in this unit.

1. Measure and figure how much sod it would take to cover a particular area of the school yard and figure out the cost of the project.

2. Select proper grasses for areas that need special attention such as shady spots, heavily traveled areas, and those that are extra dry.

3. Collect and identify several varieties of weeds and investigate ways to control them.

4. Test the affect of different fertilizers on lawn grasses.

5. Grow some sod, cut into strips, roll, and replant.

6. Visit a golf course and investigate the best types of grasses to be planted in various places on the course: greens, fairway, tee-off spots, and the rough.

7. Find poor lawns in the neighborhood and determine the cause or causes of deterioration. Discuss ways the lawns could be improved.

8. Select a home or other nearby lawn area and suggest the appropriate lawn care practices. This project may involve establishing a new lawn, maintaining a healthy lawn, or renewing an old lawn.

9. Have a greenskeeper visit the classroom. Ask him to bring some of his tools with him and let the students examine them.

10. Prepare a speech to present to the class telling about a specific turf management occupation.

11. Visit a growing site for sod. Follow this with a visit to a site where sod is being laid.

12. Discuss the importance of proper drainage and irrigation on the growth of grasses used for turf.

13. Select one of the turf management occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

   a. Special skills and aptitudes required
   b. Educational requirements
   c. Working conditions and setting
   d. Employment possibilities
   e. Personal qualifications for job
   f. Related interests of interviewee which may have affected his career choice
   g. Summer or seasonal job opportunities

14. Design a packet of materials which could introduce other students to the occupation chosen in the area of Turf Management. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number thirteen could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered and to give additional information.

15. Compare the chosen occupation in Turf Management with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

REFERENCES FOR ADDITIONAL INFORMATION

General:

Books

Dowdell, Dorothy and Joseph. Careers in Horticultural Science. pp. 12 - 13.

Hemp, Paul E. Fifty Laboratory Exercises for Vocational Horticulture Students. Interstate Printers and Publishers.

Visner, Harold and Hechtlinger, Adelaide. Simple Science Experiments. Franklin Publishing Company, Palisade, New Jersey.

4-H Leaders Horticultural Guide. National 4-H Service Committee, Inc. 59 East Van Buren Street, Chicago 5, Illinois.

George C. Ball Catalog. George C. Ball, Inc., West Chicago, Illinois.

"We Want You -- Ornamental Horticulture," Brochure. Vocational Agriculture Service, 434 Mumford Hall, University of Illinois, Urbana, Illinois.

The following handbooks may be obtained from The Pennsylvania State University, Department of Agricultural Education, University Park, Pennsylvania 16802.

- Greenhouse Crop Production
- Landscape Design
- Landscape Maintenance and Establishment
- Retail Flower Shop Operation and Management
- Turfgrass Maintenance and Establishment

Audio-Visuals

Careers in Ornamental Horticulture. Vocational Education Productions, California State Polytechnic College, San Luis Obispo, California 93401. filmstrip.

Choosing a Career in Ornamental Horticulture. Vocational Agriculture Service, 434 Mumford Hall, University of Illinois, Urbana, Illinois 61801. filmstrip.

Organizations

U. S. Department of Agriculture, Washington, D.C. 20250

Arboriculture:

Books

Future in the Nursery Industry. Richards Rosen Press, Inc., 29 East 21st Street, New York, New York 10010.

Your Native Shade Tree, Its Selection, Planting and Care. State University of New York, College of Environmental Science and Forestry, Syracuse, New York 13210.

Floriculture:

Books

Burroughs, Laura Lee. Flower Arranging - A Fascinating Hobby. Department F, Coca Cola Bottling Company, Atlanta, Georgia.

(This page retyped at the ERIC Clearinghouse in Career Education because of the illegibility of the original.)

Landscaping:

Books

Careers in Landscape Architecture. Bureau of Appointments and Occupational Information, University of Michigan, Ann Arbor, Michigan 48104.

Landscaping the Home and School Grounds. State Department of Education, Agricultural Education Department and Vocational Education Media Center, Clemson University, Clemson, S. C. 29631.

Sources of Specific Occupational Information:

Dictionary of Occupational Titles. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

Occupational Briefs. Chronicle Guidance Publications, Inc., Moravia, N. Y. 13118.

Occupational Briefs. Largo Career Briefs. Largo, Florida.

Occupational Briefs. Science Research Associates, 259 E. Erie Street, Chicago, Illinois 60611.

Occupational Briefs for Career Orientation in Applied Biological and Agricultural Occupations. Division of Agricultural Education, Department of Vocational and Technical Education, University of Illinois, Urbana, Illinois.

Occupational Outlook Handbook. United States Department of Labor, Bureau of Statistics, Supt. of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

MAJOR CAREER DEVELOPMENT DIMENSION

LIFESTYLE

RENEWABLE NATURAL RESOURCES

FORESTS
SOIL
WILDLIFE
WATER
FISH
RANGE
RECREATIONAL USES

BEFORE YOU BEGIN

For the convenience of both teacher and student, the materials in this study are divided into three sections. The last of these -- STUDENT ACTIVITIES -- is actually part of the second; it is presented as one piece, however, so that the teacher can easily lift it out, duplicate it, and distribute it to the class.

I. INSTRUCTIONAL INFORMATION

CAREER DEVELOPMENT CONCEPTS. These are the main concepts to be developed in this unit. The teacher should concentrate especially on the LIFESTYLE subconcept *leisure-time activities and interests may lead to a career, and one's career may, in turn, affect the amount and use of leisure time* because this particular subconcept seems appropriate to the study of occupations in the RENEWABLE NATURAL RESOURCES. The other five interacting subconcepts further develop other understandings necessary for making career decisions.

INFUSED SUBJECT MATTER. This is a listing of some of the knowledge and skills acquired by this level of education. The subject matter is used in carrying out the student activities.

OCCUPATIONAL INFORMATION. For the benefit of the teacher, the several occupational areas with which the students are working in section three are also outlined here. Specific occupations in each of these areas are listed in the student section.

PUPIL PERFORMANCE OBJECTIVES. The teacher should consider these as the outcomes expected for the students by the end of the unit.

II. INSTRUCTIONAL ACTIVITIES

INTRODUCTORY ACTIVITIES. These are designed to interest the students in the subject matter of this unit, as well as to provide a controlled means of developing the career development concepts. The last of these activities should lead directly into . . .

INDIVIDUAL AND SMALL GROUP ACTIVITIES. On the basis of the last INTRODUCTORY ACTIVITY, the teacher should group the students into each occupational area and distribute to each group the information and activities for its chosen area. (See Section III below.) Students in each group can then choose which specific activities they would like to do. These activities are meant to give the student a few "hands-on" experiences with the kind of work encountered in the RENEWABLE NATURAL RESOURCES occupations. The teacher is free to develop additional activities which could add to the student's understanding of this unit.

CULMINATION ACTIVITIES. After each individual or small group has completed its activity, the students should be given a chance to

share their information. They may want to present their displays, give their reports, or exchange their career packets for a few days. The teacher should also use the CULMINATION ACTIVITIES suggested.

EVALUATION ACTIVITIES. Some evaluation experiences are provided for the unit. Rather than prescribe formal testing, the materials give a suggestion for evaluating the career development concepts. Because the classroom teacher is the best qualified evaluator in her classroom, she should decide HOW a given knowledge or skill shall be demonstrated and the QUALITY and QUANTITY of knowledge or skill required for a particular child or group of children.

III. STUDENT ACTIVITIES. These activities are to be used by each group and are in the preceding section.

The numbers listed to the right of each occupation are taken from The Dictionary of Occupational Titles (D.O.T.), Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

I. INSTRUCTIONAL INFORMATION

CAREER DEVELOPMENT CONCEPTS

LIFESTYLE

Major Concept	Work affects an individual's way of life in that a person is a social being, an economic being, a family being, a leisure being, and a moral being.
Subconcept	*Leisure-time activities and interests may lead to a career, and one's career may, in turn, affect the amount and use of leisure time.*

CAREER INFORMATION

Major Concept	Basic career information will aid in making career-related decisions.
Subconcepts	*Occupations have their own work settings. The individual worker determines which aspects of an occupation may be unpleasant or pleasant.*

EDUCATIONAL AWARENESS

Major Concept	Educational skills and experiences are related to the achievement of career goals.
Subconcept	*Knowledge and skills in subject areas are helpful in occupational competence.*

ATTITUDES AND APPRECIATIONS

Major Concept	Society is dependent upon the productive work of individuals.
Subconcept	*Specialized occupations result in an interdependent society.*

SKILL AWARENESS

Major Concept	All occupations require general and specific skills.
Subconcept	*Some skills are common to many career areas.*

ECONOMIC AWARENESS

Major Concept	Basic economic understanding will aid in making career-related decisions.
Subconcept	*Economic trends can influence a career choice.*

INFUSED SUBJECT MATTER

Mathematics
  1. Tallies
  2. Measurements
  3. Cost
  4. Percents
  5. Scale Drawings

Language Arts
  1. Research
  2. Presentations
  3. Interviews
  4. Debate

Science
  1. Classification
  2. Genetics

Social Studies
  1. Maps
  2. History
  3. Geography

OCCUPATIONAL INFORMATION

Renewable Natural Resources

Agricultural resources which are capable of reproducing or replenishing themselves are known as renewable natural resources. The occupations in this study are involved in the conservation and management of these resources for the economic and recreational benefit of mankind.

Forests: The principal activities include forest maintenance, reforestation, insect and disease control, and fire prevention.

Soil: The principal activities include offering information and services in water control, prevention of soil erosion, soil rehabilitation, land use, and land measurement.

Wildlife: The principal activities include studying and providing information on migrations, habitats, and other characteristics of wildlife; developing methods of wildlife conservation; and propagating game for economic and recreational purposes.

Water: The principal activities include helping urban and rural land managers control, purify, transport, and conserve their water supply.

Fish: The principal activities include breeding and stocking fish; regulating fish population in lakes, rivers, and ponds; and controlling disease.

Range: The principal activities include developing and protecting range lands for grazing, recreation, and wildlife by preventing overgrazing, erosion, and fire; controlling disease and poisonous plants; and maintaining roads, trails, water holes, and salt stations.

Recreational Uses: The principal activities include planning of campsites and recreational centers; participating in enforcement of recreational rules and regulations relating to parking, campfires, use of facilities, and sanitation to insure protection of picnic sites, campgrounds, and hunting and fishing areas; breeding and raising of game; and wildlife research.

PUPIL PERFORMANCE OBJECTIVES

LIFESTYLE

. . . match a list of hobbies with possible careers in the Renewable Natural Resources.

. . . compare individual interests with those necessary for an occupation in the Renewable Natural Resources.

CAREER INFORMATION

. . . identify the occupations in the Renewable Natural Resources most common to any given area of the country.

EDUCATIONAL AWARENESS

. . . identify ways in which man helps some of the Renewable Natural Resources perpetuate themselves.

ATTITUDES AND APPRECIATIONS

. . . list how a variety of Renewable Natural Resources improves man's well-being or happiness.

SKILL AWARENESS

. . . identify some skills common to a Renewable Natural Resource occupation of the student's choice.

ECONOMIC AWARENESS

. . . graph a fifty-year time span of the amount of time given during a work year to vacation time.

II. INSTRUCTIONAL ACTIVITIES

The instructional activities have been designed to develop the CAREER DEVELOPMENT CONCEPTS using a variety of subject matter, knowledge, and skills and appropriate occupational information. The teacher may develop additional activities which could add to the student's understanding of this unit.

INTRODUCTORY ACTIVITIES	CAREER DEVELOPMENT CONCEPTS
1. List with the class those activities which people usually consider hobbies. Have the students record the hobbies which they now have or could be interested in.	*Leisure-time activities and interests may lead to a career, and one's career may, in turn, affect the amount and use of leisure time.* **Lifestyle**
2. Have the students look at a topographical map which shows forest land, range land, rivers, and lakes. Are there any such areas near their homes? Which? Can they tell by the map whether they are mainly urban, rural or wilderness areas? Would they like to work in one of these areas? Would they like to live in any of them? Would they have to move out of their location if they considered a particular occupation in the Renewable Natural Resources?	*Knowledge and skills in subject areas are helpful in occupational competence.* **Educational Awareness** *Occupations have their own work settings.* **Career Information**
3. Discuss with them the subconcept of lifestyle and career information. Would their lifestyle change if they went into one of these occupations? How? Why?	*Leisure-time activities and interests may lead to a career, and one's career may, in turn, affect the amount and use of leisure time.* **Lifestyle** *Occupations have their own work settings.* **Career Information**
4. Have the class list the places that people go on vacations today. Interview parents and grandparents to learn where they went on vacation twenty to fifty years ago. Do more people go on more vacations or trips today than before? Why? Will the shorter work week and higher wages make more vacations possible in the future? Will vacationers or tourists affect the number of jobs in the area of Renewable Natural Resources? How will concern for the environment affect the number of careers in this	*Economic trends can influence a career choice.* **Economic Awareness**

area? Will the economy affect the money spent in this area? How and why?

5. Have the students assess their likes and dislikes.
General: I like or dislike being alone; working around water; working with groups of people in rural or urban areas; being away from home for extended time periods; being outside in various working conditions such as rain, snow, or fire; science; conserving wildlife.
Specific: I am interested in forest maintenance and reforestation; developing parks and guiding vacationers; prevention of soil erosion and grounds maintenance; migrations, habitats of wildlife; purification and conservation of water; breeding, stocking, and regulating fish; grazing lands and trails.

The individual worker determines which aspects of an occupation may be unpleasant or pleasant.
Career Information

Use the assessment list developed in the last activity to help each student determine which of the areas listed below he would like to investigate.

SMALL GROUP OR INDIVIDUAL ACTIVITIES

See student pages: Forests - p. 147
Soil - p. 149
Wildlife - p. 151
Water - p. 153
Fish - p. 155
Range - p. 157
Recreational Uses - p. 159

CULMINATION ACTIVITIES

1. Have each group discuss how man helps our natural resources renew themselves. Show how leisure-time activities and interests of people in the various Renewable Natural Resources have influenced career decisions.

Specialized occupations result in an interdependent society.
Attitudes and Appreciations

2. Identify the individual leisure-time activities which could lead to careers in this area.

Leisure-time activities and interests may lead to a career, and one's career may, in turn, affect the amount and use of leisure time.
Lifestyle

3. Identify skills needed for a career in natural resources that could also be used in other careers. List skills that are unique to this area.

Some skills are common to many career areas.

Skill Awareness

EVALUATION

Each group makes a checklist of the leisure-time activities which could be developed into careers in the occupational area they have studied. A composite list should be made from all the occupations studied. The students then match their individual interests with those on the checklist. At the same time, each student can see what interests he would have to develop were he to select any one of these areas.

RESOURCES

See "References for Additional Information" page.

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III. STUDENT ACTIVITIES

RENEWABLE NATURAL RESOURCES

Forests: The principal activities include forest maintenance, reforestation, insect and disease control, and fire prevention.

OCCUPATION	D.O.T.
Timber stand improvement foreman	940.137
Forestry survey aide	441.384
Forestry research assistant	441.384
Tree nursery management assistant	180.168
Forest fire control technician	441.887
Forest recreation technician	040.081
Park naturalist (all areas)	099.228
Land manager (all areas)	189.118
Foreman - parks, wildlife, etc.	407.134
Conservation aide technician (all areas)	040.081
Research technician - parks, wildlife, etc.	040.081
Soil conservation technician	040.081
Forest ecologist	040.081
Forest genealogist	052.088
Forest inspector	442.687
Fire lookout	441.168
Fire warden	441.168
Fire patrolman	441.687
Fire tower operator	441.168
Forest fire fighter	441.887
Sprayer	441.887
Zoologist	041.081

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a student or group can list what man does to help the resource perpetuate itself. Included should be the locations where this type of work is available. The kind of LIFESTYLE that might be assumed if one were to live and work in the occupational area of Forestry could be determined and compared and/or contrasted with the present lifestyle. A list of aptitudes and skills needed by a person working in this area should be prepared.

1. Make a survey of the trees in the neighborhood. Identify those trees which should be left to grow if they were in a forest to be harvested as lumber. Which would be left to grow if they were in a recreational area? What percent of the neighborhood trees would be good for lumber?

2. Measure the girth of the tree trunks. Are the trees young or old? What is the age of the oldest tree in the neighborhood?

3. Find a tree that has been cut down recently. What story does it tell? How does a tree tell about dry years and wet years?

4. Gather seeds from every different kind of tree in the area. Investigate the time needed for the different kinds to germinate and the required conditions for germination.

5. Obtain a wood sample from a local lumber dealer. Does most of his lumber come from local forests, other parts of the U. S., or other countries? Trace some of the lumber varieties back to their points of origin.

6. Find out how the trees harvested in the area are used.

7. Determine the principal use for each type of wood found in a local lumber yard. For example, some wood is better for making furniture, and other wood is better for constructing houses.

8. Select one of the Forestry occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

- a. Special skills and aptitudes required
- b. Educational requirements
- c. Working conditions and setting
- d. Employment possibilities
- e. Leisure-time activities of interviewee
- f. Related interests of interviewee which may have affected his career choice
- g. Summer job opportunities

9. Design a packet of materials which could introduce other students to the occupation chosen in the area of Forestry. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number eight could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered and to give additional information.

10. Compare the Forestry occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

RENEWABLE NATURAL RESOURCES

Soil: The principal activities include offering information and services in water control, prevention of soil erosion, soil rehabilitation, land use, and land measurement.

OCCUPATION	D.O.T.
Soil scientist	040.181
Agronomist	040.181
Landscape supervisor	407.181
Garden center technician	260.458
Soil conservation aide	040.081
Gardener or caretaker	407.884
Assistant greenskeeper	407.138
Grounds superintendent	407.138
Soil conservationist	040.081
Soil conservation agricultural engineer	040.081
Soil conservation civil engineer	040.081
Soil conservation administrative employee	040.081
Soil conservation engineering technician	040.081
Soil conservation technician	040.081
Park landscape technician	407.181

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a student or group can list what man does to help this resource perpetuate itself. Included should be the locations where this type of work is available. The kind of LIFESTYLE that might be assumed if one were to live and work in the occupational area of soil could be determined and compared and/or contrasted with the present lifestyle. A list of aptitudes and skills needed by a person working in this area should be prepared.

1. Collect soil samples from the area using small plastic vials. Record exactly where each sample was taken. Determine some causes for differences in the samples. Did some grow vegetation? Why or why not? Could the soil be improved? How?

2. Make a map of a selected area which includes grass lands (such as lawns or parks), crops (or gardens) and trees. Does the soil differ in any of these areas?

3. Illustrate the importance of soil by tracing the origin of things used every day. For example: Shoes - department store - shoe factory - tannery - packing plant (where animals are slaughtered) - stockyard - farm (where cow was produced) - corn, oats and hay (crops the cow eats) - soil where these crops are grown. Trace a candy bar, auto tire, school book, or make some other choice. This exercise may require some deep searching, but it should turn up some interesting information.

4. Plan a display showing stony soil, clay soil, humus soil, and sandy soil. Show the different uses for each type of soil. Make a display showing the process of soil erosion or the effect of fertilizer on the soil.

5. Select one of the Soil occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

a. Special skills and aptitudes required
b. Educational requirements
c. Working conditions and setting
d. Employment possibilities
e. Leisure-time activities of interviewee
f. Related interests of interviewee which may have affected his career choice
g. Summer job opportunities

6. Design a packet of materials which could introduce other students to the occupation chosen in the area of Soil conservation. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number five could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered to give additional information.

7. Compare the Soil occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

RENEWABLE NATURAL RESOURCES

Wildlife: The principal activities include studying and providing information on migrations, habitats, and other characteristics of wildlife; developing methods of wildlife conservation; and propagating game for economic and recreational purposes.

OCCUPATION	D.O.T.
Gamebird breeder	419.181
Game farm worker	419.884
Government trapper or hunter	379.168
Wildlife aide	419.884
Wildlife and conservation research aide	379.168
Natural history curator	102.118
Wildlife biologist	041.081
Fish biologist	041.168
Fish management specialist	041.168
Aviary manager	409.168
Game (warden) protector	379.168
Biologist aide	049.384
Wildlife technician	019.281
Taxidermist	199.281
Game management employee	451.181
Refuge manager	187.168
Predatory - animal hunter	451.781
Trapper	451.781
Game farmer	419.181
Gamekeeper	451.181
Manager, quail farm	189.118
Game farm helper	419.884
Quail farm worker	419.884
Research technician - parks, wildlife, etc.	040.081

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a student or group can list what man does to help this resource perpetuate itself. Included should be the locations where this type of work is available. The kind of LIFESTYLE that might be assumed if one were to live and work in the occupational area of Wildlife could be determined and compared and/or contrasted with the present lifestyle. A list of aptitudes and skills needed by a person working in this area should be prepared.

1. Is there any wildlife in the neighborhood? Conduct a survey to find out. Do these animals live here all year or do they only appear at certain seasons? Why do they live in this particular habitat? Are all of these animals beneficial to man? Why or why not?

2. Could more beneficial wildlife be attracted to the neighborbood? How?

3. Make a picture display of the wildlife found in the neighborhood.

4. Prepare a talk on the need for wildlife in the area.

5. Prepare a talk on the means of controlling undesirable wildlife. Are any wildlife species harmful to man? What is man doing to control them?

6. Prepare a chart showing some ways in which animals depend upon one another. For example, some animals provide food for other animals, the vacated home of one animal may provide a new home for another, or the building of a dam may provide a habitat for many kinds of animals.

7. Select one of the Wildlife occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

- a. Special skills and aptitudes required
- b. Educational requirements
- c. Working conditions and setting
- d. Employment possibilities
- e. Leisure-time activities of interviewee
- f. Related interests of interviewee which may have affected his career choice
- g. Summer job opportunities

8. Design a packet of materials which could introduce other students to the occupation chosen in the area of wildlife. Include pictures of people at their work, the equipment they use, their work setting. Information gathered in activity number seven could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered to give additional information.

9. Compare the wildlife occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

RENEWABLE NATURAL RESOURCES

Fish: The principal activities include breeding and stocking fish; regulating fish population in lakes, rivers, and ponds; and controlling disease.

OCCUPATION	D.O.T.
Fish hatchery manager (or superintendent)	436.884
Fishery foreman	189.118
Fish processing technician	180.168
Fish detection technician	022.168
Food fisheries technician	041.168
Fish hatchery worker	436.884
Fish farm helper	436.181
Seine man	431.884
Biologist	041.081
Laboratory technician - ocean fishing	022.168
Fish warden superintendent	379.168
Fish warden	379.168
Fish culturist	041.168
Fish farmer	436.181
Fishing instructor	439.228
Lake manager	189.118
Live bait dealer	162.158
Aquaculture technician	041.168
Marine quality control technician	041.081
Estuarine research assistant	041.168
Marine pollution research assistant	041.168
Natural history curator	102.118
Wildlife biologist	041.081
Fish biologist	041.168
Fish management specialist	041.168
Game (warden) protector	379.168
Biologist aide	049.384
Experimental biology technician	041.081
Wildlife technician	019.281
Taxidermist	199.281
Refuge manager	187.168

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a student or group can list what man does to help this resource perpetuate itself. Included should be the location where this type of work is available. The kind of LIFESTYLE that might be assumed if one were to live and work in the occupational area of Fish could be determined and compared and/or contrasted with the present lifestyle. A list of aptitudes and skills needed by a person working in this area should be prepared.

1. Take a census of fish native to the area.

2. Prepare a chart showing how fish depend on each other and on other plants and animals. For example, some animals provide food for other animals, and some animals keep the water clean for other animals.

3. Go to a near-by water area and collect a variety of plants which grow in the water. Identify their contributions to the aquatic environment. What happens when there are too few or too many plants? What causes either too little or too much plant life?

4. Prepare a program identifying the various fish grown for commercial purposes. Include the breeding, selecting, and stocking of streams and lakes.

5. Show pictures of the methods of harvesting and preserving all fish, including ocean fish.

6. Prepare a display of fishing equipment. Explain the differences and purposes of the variety of hooks, baits, and rods.

7. Prepare a map showing the best fishing grounds for various types of fish.

8. Select one of the Fish occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

   a. Special skills and aptitudes required
   b. Educational requirements
   c. Working conditions and setting
   d. Employment possibilities
   e. Leisure-time activities of interviewee
   f. Related interests of interviewee which may have affected his career choice
   g. Summer job opportunities

9. Design a packet of materials which could introduce other students to the occupation chosen in the area of Fish. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number eight could be recorded on cassette tapes to accompany the pictures and pamphlets which have been gathered to give additional information.

10. Compare the Fish occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

RENEWABLE NATURAL RESOURCES

Range: The principal activities include developing and protecting range lands for grazing, recreation, and wildlife by preventing overgrazing, erosion, and fire; controlling disease and poisonous plants; and maintaining roads, trails, water holes, and salt stations.

OCCUPATION	D.O.T.
Range manager	040.081
Range technician	040.081
Range conservationist	040.081

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a student or group can list what man does to help this resource perpetuate itself. Included should be the locations where this type of work is available. The kind of LIFESTYLE that might be assumed if one were to live and work in the occupational area of Range could be determined and compared and/or contrasted with the present lifestyle. A list of aptitudes and skills needed by a person working in this area should be prepared.

1. Identify a range area which is personally accessible. Plan a visit to it and take samples of plants back to the classroom. Identify those plants that are eaten by range animals. Are some of these plants better forage crops for some animals than others? Why?

2. Make a map or range areas, both of forested and nonforested land, in the state. Identify the types of domestic animals that graze on these lands. Explain why some lands are used for certain kinds of animals.

3. Identify types of wildlife interesting to game hunters that forage on the range lands.

4. Investigate a watershed project in operation in the area. Find out why it is necessary and how it contributes to the conservation of surrounding land.

5. Investigate the number of acres needed to support each kind of range animal. What are some problems that arise when there are more animals than the land can support? What are some solutions?

6. Prepare a paper illustrating the problems between cattle men and sheep men.

7. Research the reasons for range wars, both in this country and in other countries.

8. Select one of the Range occupations suggested and research it. Interview someone in this area if possible. Gather the following information from the interviewee and any reference material available:

a. Special skills and aptitudes required
b. Educational requirements
c. Working conditions and setting
d. Employment possibilities
e. Leisure-time activities of interviewee
f. Related interests of interviewee which may have affected his career choice
g. Summer job opportunities

9. Design a packet of materials which could introduce other students to the occupation chosen in the area of Range. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number eight could be recorded on cassette tapes to accompany the pictures and pamphlets which have been gathered to give additional information.

10. Compare the Range occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

RENEWABLE NATURAL RESOURCES

Recreational Uses: The principal activities include planning of campsites and recreational centers; participating in enforcement of recreational rules and regulations relating to parking, campfires, use of facilities, and sanitation to insure protection of picnic sites, campgrounds, and hunting and fishing areas; breeding and raising of game; and wildlife research.

OCCUPATION	D.O.T.
Range conservationist	040.081
Wildlife technician	040.081
Game farm worker	451.181
Enforcement agent	379.168
Wildlife biologist	041.081
Forest recreation technician	040.081
Park naturalist	099.228
Park superintendent	188.168
Park ranger	169.168
Park landscape technician	407.181
Park worker	407.887
Recreation farm manager	195.228
Recreation area supervisor	407.138
Forest ranger	040.081
Golf course manager	180.168
Parkway foreman	407.134
State or national park employee	441.168
Park attendant	407.887
Ground maintenance technician	899.133
Roadside development engineer	019.081
Roadside development technician	019.081
Animal keeper	451.181
Campground caretaker	407.887
Huntsman/animal keeper/hunting and fishing guide	452.868
Research technician - parks, wildlife, etc.	040.081

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a student or group can list what man does to perpetuate the renewable natural resources for recreational purposes. Included should be the locations where this type of work is available. The kind of LIFESTYLE that might be assumed if one were to live and work in the occupational area of Recreation could be determined and compared and/or contrasted with the present lifestyle. A list of aptitudes and skills needed by a person working in this area should be prepared.

1. Secure a map of the town, county, or township and locate all of the recreational areas.

2. Plan a new recreational area in the county.

    a. What natural areas will be developed?
    b. What buildings will be needed?
    c. What sports equipment will make the park more functional for adults and children?
    d. Why is the area selected a better area than any others that could have been suggested?
    e. Make a scale drawing of the proposal. Indicate streets or highways, paths or trails, water areas, and major structures.
    f. Prepare a list of persons needed to operate the park.
    g. Estimate the cost of the project.

3. Prepare a guide brochure for prospective hunters and fishermen.

4. Make a scale drawing of a campground area which could be maintained. Include both permanent and temporary structures, as well as the landscaping needed to make the area attractive.

5. Design a roadside park. Indicate roads, building, and landscape features.

6. Build a classroom terrarium to hold native plants.

7. Prepare a talk to give to the class (record it on a cassette tape, if desired) which would explain the value of particular plants to the area. Some of those plants should be displayed in the terrarium.

8. Select a historic spot in the area. Research it and present an illustrated talk about it. Use photographs, drawings, models, and maps which would be helpful to the tourists visiting this area.

9. Get samples of camping permits and fishing and hunting license forms. Duplicate them and have the class fill them out. Be sure to include a list of possible rules and regulations.

10. Prepare a report about the recreational uses of forests, the history of the park services, the importance of forests to the total environment, and future trends for uses of forest land.

11. Color a map of the United States locating the national parks, and tell about the types of recreation found in each. If possible, secure pictures of the parks to show the class.

12. Find out about bird banding which is conducted by the U. S. Fish and Wildlife Service. Why is this important and what are the requirements for those who do it? If possible talk to a qualified bird bander.

13. Find pictures of animals and birds native to the state and make a scrapbook. Write a brief story about each, listing such things as how they are recognized, where they live, what they eat, who their enemies are, and how their tracks look. Discuss certain species which are in danger of becoming extenct and what can be done to prevent this. Discuss which animals and birds are hunted and the rules and regulations of hunting.

14. Select one of the Recreational occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

a. Special skills and aptitudes required
b. Educational requirements
c. Working conditions and setting
d. Employment possibilities
e. Related interests of interviewee which may have affected his career choice
f. Summer or seasonal job opportunities

15. Design a packet of materials which could introduce other students to the occupation chosen in the area of Recreational Uses. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number fourteen could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered and to give additional information.

16. Compare the Recreational occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

REFERENCES FOR ADDITIONAL INFORMATION

General:

Books

Dudley, Ruth Hubell. *Our American Trees.* Crowell, 1956. illus.

Farb, Peter. *The Forest.* Time-Life books, 1961. illus.

Hutchins, Ross E. *This is a Tree.* Dodd, 1964. illus.

McCormick, J. *The Life of the Forest.* McGraw, 1966.

Milne, Larus J. *Because of a Tree.* Athenum, 1963.

Audio-Visuals

Conserving our Forests Today. Encyclopedia Britannica Educational Films, Inc. 1970. film.

Trees. National Audubon Society. slides.

Organizations

The American Forestry Association, 1319 18th Street, N. W., Washington, D. C. 20036.

The U. S. Department of Agriculture - Forest Service, Washington, D. C. 20250.

Soil:

Books

Kellogg, Charles E. *The Soils That Support Us; an Introduction to the Study of Soils and Their Use by Man.* Macmillian, 1941.

Organizations

American Society of Agronomy, 677 South Segoe Road, Madison, Wisconsin 53711.

Information Division, Soil Conservation Service, U. S. Department of Agriculture, Washington, D. C. 20250.

Wildlife:

Books

Leonard, Jonathan. *Atlantic Beaches.* Silver Burdett/Time-Life, 1972. illus.

McCoy, J. J. *Nature Sleuths; Protectors of Our Wildlife.* Lathrop, 1969. illus.

Audio-Visuals

Wildlife Conservation. Budek, 1972. filmstrip.

Organizations

Fish and Wildlife Service, U. S. Department of the Interior, Washington 25, D. C.

Wildlife Management Institute, 709 Wire Building, Washington, D. C. 20005.

The Wildlife Society, Suite S176, 3900 Wisconsin Avenue, N. W., Washington, D. C. 20016.

Water:

Audio-Visuals

How Man Obtains Water. Doubleday Multimedia, 1973. filmloop.

Organizations

American Waterworks Association, 2 Park Avenue, N. Y. 16, N. Y.
The U. S. Department of Agriculture, Soil Conservation Service, Washington, D. C.

Fish:

Books

Van Gytenbeek, R. P. The Way of a Trout. Lippincott, 1972. illus.

Organizations

American Fisheries Society, 1404 New York Avenue, N. W., Washington, D. C. 20005.
Bureau of Sport Fisheries and Wildlife, U. S. Department of the Interior Fish and Wildlife Service, 18th and C Streets, N. W., Washington, D. C. 20240.
Regional Bureaus of Sport Fisheries and Wildlife.
Sport Fishing Institute, 719 13th Street, N. W., Washington, D. C. 10005.
State Fish and Game Commission.

Range:

Organizations

American Society of Range Management, Box 5041, Portland, Oregon, 97213.
Bureau of Land Management and Bureau of Indian Affairs, U. S. Department of the Interior, Washington, D. C. 20242.
Forest Service and Soil Conservation Service, U. S. Department of Agriculture, Washington, D. C. 20251.

Recreational Uses:

Organizations

American Forestry Association, 919 17th St. N. W., Washington, D. C. 20006.
Director, National Park Service, U. S. Department of the Interior, Washington, D. C. 20240.
The National Audubon Society, 1130 Fifth Avenue, N. Y. 28, N. Y.
Society of American Foresters, 1010 Sixteenth St., N. W., Washington, D. C. 20036.
State Departments of Conservation, Division of Parks and Memorials, State Capitols.
United States Department of Interior, National Park Service, Washington, D. C. 20240.
Wildlife Management Institute, 709 Wire Building, Washington, D. C. 20005.

Sources of Specific Occupational Information:

Dictionary of Occupational Titles. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

Occupational Briefs. Chronicle Guidance Publications, Inc., Moravia, N. Y. 13118.

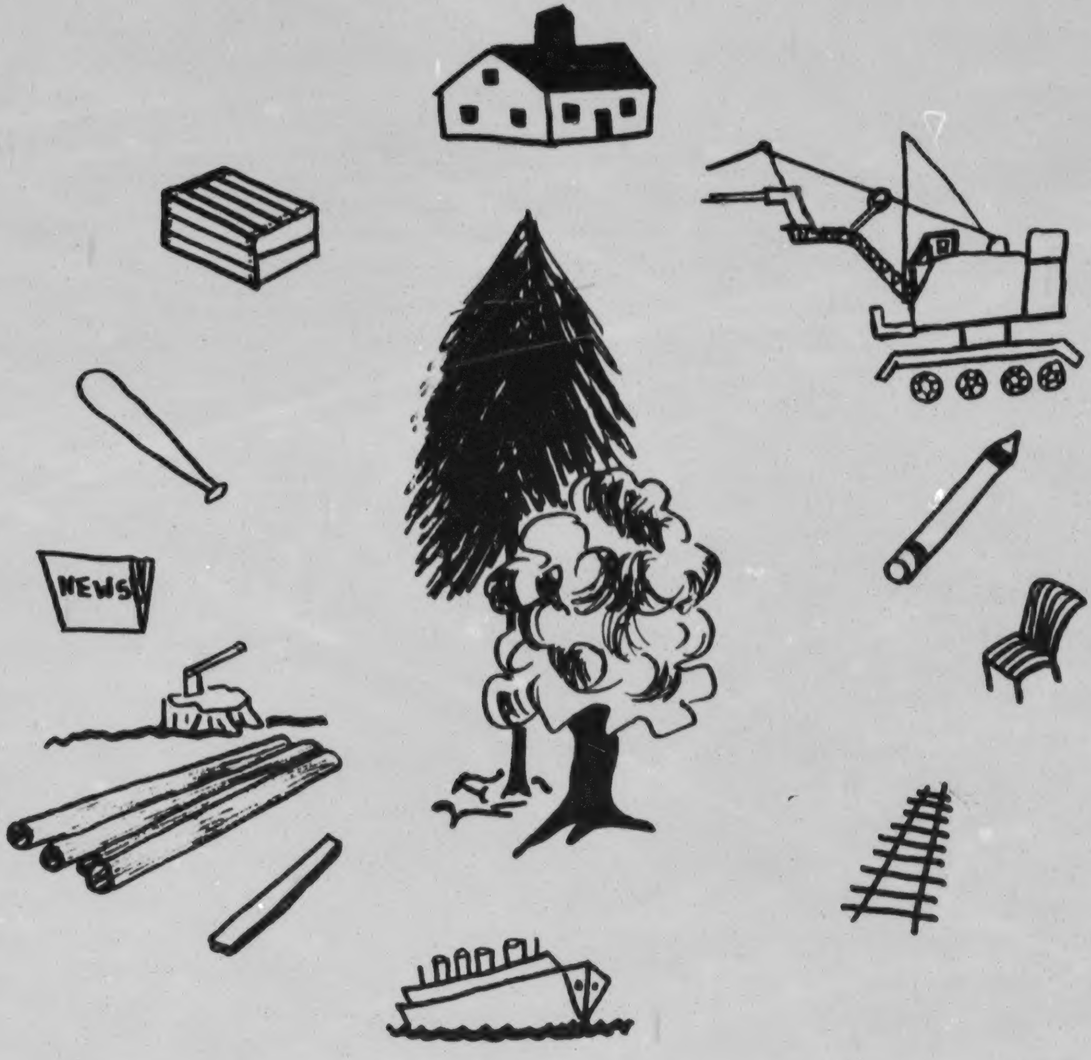
Occupational Briefs. Largo Career Briefs, Largo, Florida.

Occupational Briefs. Science Research Associates, 259 East Erie St., Chicago, Illinois 60611.

Occupational Outlook Handbook. United States Department of Labor, Bureau of Statistics, Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

MAJOR CAREER DEVELOPMENT DIMENSION

SELF-DEVELOPMENT



FORESTRY

PRODUCTION & PROPAGATION PROTECTION PRODUCTS & BY-PRODUCTS

BEFORE YOU BEGIN

For the convenience of both teacher and student, the materials in this study are divided into three sections. The last of these -- STUDENT ACTIVITIES -- is actually part of the second; it is presented as one piece, however, so that the teacher can easily lift it out, duplicate it, and distribute it to the class.

I. INSTRUCTIONAL INFORMATION

CAREER DEVELOPMENT CONCEPTS. These are the main concepts to be developed in this unit. The teacher should concentrate especially on the SELF-DEVELOPMENT subconcept *there are relationships among interests, aptitudes, achievements, values, and occupations* because this particular subconcept seems appropriate to the study of occupations in the area of FORESTRY. The other five interacting subconcepts further develop other understandings necessary for making career decisions.

INFUSED SUBJECT MATTER. This is a listing of some of the knowledge and skills acquired by this level of education. The subject matter is used in carrying out the student activities.

OCCUPATIONAL INFORMATION. For the benefit of the teacher, the several occupational areas with which the students are working in section three are also outlined here. Specific occupations in each of these areas are listed in the student section.

PUPIL PERFORMANCE OBJECTIVES. The teacher should consider these as the outcomes expected for the students by the end of the unit.

II. INSTRUCTIONAL ACTIVITIES

INTRODUCTORY ACTIVITIES. These are designed to interest the students in the subject matter of this unit, as well as to provide a controlled means of developing the career development concepts. The last of these activities should lead directly into . . .

INDIVIDUAL AND SMALL GROUP ACTIVITIES. On the basis of the last INTRODUCTORY ACTIVITY, the teacher should group the students into each occupational area and distribute to each group the information and activities for its chosen area (See Section III below). Students in each group can then choose which specific activities they would like to do. These activities are meant to give the student a few "hands-on" experiences with the kind of work encountered in the FORESTRY occupations. The teacher is free to develop additional activities which could add to the student's understanding of this unit.

CULMINATION ACTIVITIES. After each individual or small group has completed its activity, the students should be given a chance to share their information. They may want to present their displays,

give their reports, or exchange their career packets for a few days. The teacher should also use the CULMINATION ACTIVITIES suggested.

EVALUATION ACTIVITIES. Some evaluation experiences are provided for the unit. Rather than prescribe formal testing, the materials give a suggestion for evaluating the career development concepts. Because the classroom teacher is the best qualified evaluator in her classroom, she should decide HOW a given knowledge or skill shall be demonstrated and the QUALITY and QUANTITY of knowledge or skill required for a particular child or group of children.

III. STUDENT ACTIVITIES. These activities are to be used by each group and are in the preceding section.

The numbers listed to the right of each occupation are taken from The Dictionary of Occupational Titles (D.O.T.), Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

I. INSTRUCTIONAL INFORMATION

CAREER DEVELOPMENT CONCEPTS

SELF-DEVELOPMENT

Major Concept	Individuals differ in their interests, aptitudes, values, and achievements.
Subconcept	*There are relationships among interests, aptitudes, achievements, values, and occupations.*

CAREER INFORMATION

Major Concept	Basic career information will aid in making career-related decisions.
Subconcept	*Occupations have their own vocabularies.*

EDUCATIONAL AWARENESS

Major Concept	Educational skills and experiences are related to the achievement of career goals.
Subconcept	*Knowledge and skills in subject areas are helpful in occupational competence.*

SKILL AWARENESS

Major Concept	All occupations require general and specific skills.
Subconcept	*Some occupations require skills using particular tools.*

ECONOMIC AWARENESS

Major Concept	Basic economic understanding will aid in making career-related decisions.
Subconcept	*Work is a means of gaining societal rewards.*

ATTITUDES AND APPRECIATIONS

Major Concept	Society is dependent upon the productive work of individuals.
Subconcept	*Completion of a worthwhile task has value for the worker and for society.*

INFUSED SUBJECT MATTER

Mathematics
1. Measurement
2. Computation
3. Estimates
4. Averages

Science
1. Genetics
2. Classification
3. Observations
4. Scientific methods

Language Arts
1. Research
2. Creative writing
3. Presentations
4. Interviews
5. Dictionaries
6. Plays
7. Comparisons
8. Role playing
9. Puzzles

Social Studies
1. Maps
2. Geography
3. Economics
4. Environmental control and ecology
5. History

OCCUPATIONAL INFORMATION

Forestry

Forestry is the young and expanding profession of scientific management of forests, forest land, and their products in order to insure continuous production of goods and services. The occupations in this study are concerned with managing and utilizing timber resources; providing facilities for recreation; looking after grazing lands; developing homes for wildlife; safeguarding water supplies; reproducing, protecting, and improving forests; and researching methods of keeping the land productive.

Production and Propagation: The principal activities include planting, transplanting, cruising, and estimating timber; felling, limbing, and bucking trees; loading, transporting, and unloading logs; and dragging or skidding logs to a central loading area.

Protection: The principal activities include insect, fire, disease, erosion, and flood control; combating damage done by cattle and humans; and conducting research into methods of cutting and removing timber with minimum waste and damage.

Products and By-Products: The principal activities are concerned with putting wood into a more useful and convenient form. This includes separating and staking logs; cutting them into proper lengths, widths, and thicknesses; debarking, peeling, clipping, drying, gluing, cutting into sheets, sanding, grading, stamping, packing, and transporting to supply wholesalers and distributors; and gathering and/or collecting various by-products from the trees.

PUPIL PERFORMANCE OBJECTIVES

SELF-DEVELOPMENT

. . . compare personal interests and achievements with those necessary for a career in forestry.

. . . indicate in writing three or more reasons for personal interest or disinterest in a career in forestry.

CAREER INFORMATION

. . . demonstrate knowledge or most of the critical words using a student-devised crossword puzzle containing basic vocabulary definitions for a vocation in forestry.

EDUCATIONAL AWARENESS

. . . identify from a list of entry level forestry skills those possessed or needed in pursuing a career in forestry.

. . . identify five native trees by shape, leaf, bark, seed, or fruit; and identify the people engaged in forestry occupations who use knowledge of tree identification in their work.

. . . identify some enemies of a forest and list some methods of control used by forestry employees.

SKILL AWARENESS

. . . identify five tools which might be used by forestry employees, and list some rules of safety in their handling and operation.

ECONOMIC AWARENESS

. . . express orally the relationship between the community and the forest, and its products, and the effect each has on the other.

ATTITUDES AND APPRECIATIONS

. . . plan and take part in a conservation project for the community.

II. INSTRUCTIONAL ACTIVITIES

The instructional activities have been designed to develop the CAREER DEVELOPMENT CONCEPTS using a variety of subject matter, knowledge and skills, and appropriate occupational information. The teacher may develop additional activities which could add to the student's understanding of this unit.

INTRODUCTORY ACTIVITIES	CAREER DEVELOPMENT CONCEPTS
1. Initiate with the class a discussion of the meaning of work. Why do people work? Do people work for different reasons? Is work for one person, play for another? What are some of the rewards people receive for their work? What happens when people do not complete a job? Must a job always be completed once it is started? What makes the difference? What happens to a person's self-concept if he rarely finishes a task?	*Work is a means of gaining societal rewards.* Economic Awareness *Completion of a worthwhile task has value for the worker and for society.* Attitudes and Appreciations
2. Have the class write down all the things they can think of that come from wood. Talk about their lists and lead into a discussion of forests and their products and their importance to a community. Ask the students how many of their parents are engaged in work directly or indirectly connected with forests. Have them list as many people as they can who would be without a job if forests became nonproductive.	*Work is a means of gaining societal rewards.* Economic Awareness
3. Take the class on a hike through the woods asking them to make use of all their senses to make the trip more meaningful. What things did they see, hear, smell, or touch on the hike? Did they enjoy it? Were they afraid at any time? Did anyone mind walking? Were they interested in the wildlife they saw? Did anyone observe any damage done to the area? Does anyone feel he would enjoy working in this type of an environment?	*There are relationships among interests, aptitudes, achievements, values, and occupations.* Self-Development

4. Have the students brainstorm the following: What knowledge and skills taught in school do they think would be useful in the occupational area of forestry? What kinds of tools do they think would be needed in this occupation? (After the small group work, have the students look at the results of this brainstorming to see how accurate they were.)

Knowledge and skills in subject areas are helpful in occupational competence.

Educational Awareness

Some occupations require skills using particular tools.

Skill Awareness

5. Have the students assess their likes and dislikes.
General: I like or dislike being alone; working out-of-doors; being away from home for extended time periods; working with groups of people; working with plants; working with tools.
Specific: I am interested in the production and planting of forests; protecting trees from insects, fire, and disease; or preparing wood products to be transported from the forest.

There are relationships among interests, aptitudes, achievements, values, and occupations.

Self-Development

Use the assessment list developed in the last activity to help each student determine which of the areas listed below he would like to investigate.

SMALL GROUP OR INDIVIDUAL ACTIVITIES

See student pages:		
	Production and Propagation	- p. 179
	Protection	- p. 183
	Forest Products and By-Products	- p. 185

CULMINATION ACTIVITIES

1. Have each group discuss how society is dependent upon its area of forestry for goods and/or services.

Completion of a worthwhile task has value for the worker and for society.

Attitudes and Appreciations

2. Introduce the "What's My Line" game to the class. Have students sign in with an occupation from a FORESTRY area.

Some occupations require skills using particular tools.

Skill Awareness

Knowledge and skills in subject areas are helpful in occupational competence.

Educational Awareness

3. Ask the students to exchange crossword puzzles and dictionaries.	*Occupations have their own vocabularies.* **Career Information**
4. Review brainstorming list made in introductory activity number 4. How accurate were the students? Encourage the students to discover why they did or did not list certain items.	*Knowledge and skills in subject areas are helpful in occupational competence.* **Educational Awareness** *Some occupations require skills using particular tools.* **Skill Awareness**

EVALUATION

Each group makes a checklist of the aptitudes, interests, and values needed for the occupational area it has studied. A composite list should be made from all the occupations studied; students then compare their individual list with the composite checklist. At the same time, each student can see what aptitudes and interests he would have to develop were he to select any one of these areas.

RESOURCES

See "References for Additional Information" page.

III. STUDENT ACTIVITIES

FORESTRY

Production and Propagation: The principal activities include planting, transplanting, cruising, and estimating timber; felling, limbing, and bucking trees; loading, transporting, and unloading logs; and dragging or skidding logs to a central loading area.

OCCUPATION	D.O.T.
Logger	449.287
District forest superintendent	442.168
Transportation supervisor	184.168
Timber stand improvement foreman	940.137
Woods foreman	040.081
Logging foreman	949.137
Logging operations inspector	609.684
Surveyor	441.384
Log contractor	469.168
Pulp buyer	162.158
Log scaler	941.487
Timber market estimator	191.288
Limber	940.884
Loader operator	922.883
Gang sawyer	424.887
Chipper operator	442.887
Ranger weigher	224.487
Crawler driver	850.883
Skidway man	979.281
Resaw operator	429.887
Crane operator	921.280
Christmas tree farmer	406.887
Chokerman	942.887
Timber cruiser	449.287
Buyer for sawmill	162.158

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a student or group can make a list of the principal activities of a person engaged in the production and propagation of forests. Listed, also, should be the aptitudes and skills one would need for this type of work. A forestry dictionary should be kept to record major vocabulary words used in this area. A crossword puzzle could be compiled, using some of the most important words. Also, special tools used in this area should be noted.

1. Set up a classroom exhibit of trees found in the area. Have examples of the leaves, bark, seed, or fruit of each and have a picture of the full-grown tree so that its shape can be observed. Include both deciduous and evergreen trees.

2. Make plans with a tree removal service, electric company, Christmas tree farmer, or state farm bureau, lumber company, etc. to observe a tree being cut down. Are any special clothes worn? What equipment is used? What safety precautions are taken? How long did it take? What was done with the tree after it was cut down? What term is used for this process?

3. Learn how to estimate the number of board feet of lumber in a tree using a biltmore stick and a hypsometer. The aid of the mathematics teacher could be enlisted. What is meant by board feet of lumber and diameter at breast feet? Practice measuring first on wastebaskets, etc. in the classroom. Then compare the number of board feet available in a given area with the number of board feet available in the neighborhood of a friend.

4. Obtain the cost of lumber from a local supplier and compute the retail value of the trees measured. Tree identification and computation of costs according to wood are needed. Which is the most expensive? Which trees are the most valuable? Why?

5. Make arrangements with a shop teacher or carpenter to display different kinds of wood. Notice the differences in colors, wood grains, and hardness. What is meant by hardwoods and softwoods?

6. Make a report on how man replaces the thousands of trees used every year. How are they planted and in what regions of the country are there large forests for commercial use? What is meant by a climax forest? How can the age of a forest be told by the trees that are grown there? Which trees grow the fastest?

7. Make a mural of the life of a tree showing the process of planting, harvesting, felling, loading, and taking to a central location for the logging operation.

8. Design a plan to plant some trees for one of the following reasons: a community forest, home windbreak, field shelterbelt, garden nursery for windbreak stock or shadetree stock, or a Christmas tree nursery. Find out what tools are needed and where the trees should be planted. Prepare the area for planting between January and March. Plant the trees in March or April and in August determine the number of living trees. Talk to a Christmas tree farmer, landscaper, etc. about methods of planting, pest control, and other pertinent information.

9. Write a theme on all the ways in which trees make a community a more pleasant and prosperous place in which to live. What is meant by the saying, "Some trees are worth twenty air conditioners"?

10. Select one of the Forestry occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

a. Special skills and aptitudes required
b. Educational requirements
c. Working conditions and setting

d. Employment possibilities
e. Related interests of interviewee which may have affected his career choice
f. Summer or seasonal job opportunities

11. Design a packet of materials which could introduce other students to the occupation chosen in the area of forestry. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number ten could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered and to give additional information.

12. Compare the forestry occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

FORESTRY

Protection: The principal activities include insect, fire, disease, erosion, and flood control; combating damage done by cattle and humans; and conducting research into methods of cutting and removing timber with minimum waste and damage.

OCCUPATION	D.O.T.
Timber stand improvement foreman	940.137
Surveyor	441.384
Forest fire control technician	441.137
Forest fireman	441.887
Fire guard	441.168
Treating technician	669.130
Tree surgeon	409.181
Tree service salesman	289.358
Conservation aide technician	040.081
Plant physiologist	041.081
Tree service manager	183.118
Entomologist	041.081
Biologist aide	041.081
Forest technician	005.187
Forest specialist	040.081
Forest ranger	040.081
Forest aide	441.384

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a student or group can make a list of the principal activities of a person engaged in the protection of forests. Listed should be special aptitudes and skills needed for this type of work. A forestry dictionary should be kept to record major vocabulary words used in this area. A crossword puzzle could be compiled, using some of the most important words. Also, special tools used in this area should be noted.

1. Have a Tree Insect Zoo. If possible, talk to a local entomologist, forester, etc. about local tree insects. Collect live insects. Put each in separate glass jars and carefully label each and the kind of tree it attacks. Display it with the tree bark it infests. Show the amount of damage it can do locally if uncontrolled and the ways to control it.

2. Set up a Sherlock Holmes Detective Agency and make the first case an investigation of trees in the neighborhood, park, etc., and look for clues as to why certain trees are sick. Is there evidence of fungi, insects, animal damage, fire, or old age? Present findings to the class.

3. Make a conservation trail. Locate significant conservation features along a trail and label them. Include such things as tree names and uses and den trees, trees attacked by insects or disease, fire scars on

trees, old history book stumps which show when cutting was done, wildlife food trees and shrubs, different kinds of rocks and various layers of forest floors, and young trees starting to sprout. Take the class or friends on the trail or advertise it for the community. Erect signs at both the beginning and end of the trail. Identify it with the school's name. Be sure to remove any dangerous barriers.

4. Do research on forest enemies and write a report on ways they can be controlled.

5. Print a conservationist newspaper or magazine. Include articles that would be interesting to classmates and their parents. Choose a staff of reporters. Mimeograph the newspaper and give it to classmates.

6. Research what building industries and utility companies do to prevent fungi from attacking wood.

7. Write and act out a play about forest fire fighters. Talk to a forest fireman and find out the causes of fires, the harm they can cause, the results of fires, the fire-fighting equipment used, and the special clothes worn.

8. Write a play on being lost in a forest. Find out what happens when someone does get lost. Give some special pointers on what should be done when lost.

9. Find fields where cattle are grazing. See if they've chewed on any of the trees. What can be done about this?

10. Select one of the forestry occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

a. Special skills and aptitudes required
b. Educational requirements
c. Working conditions and setting
d. Employment possibilities
e. Related interests of interviewee which may have affected his career choice
f. Summer or seasonal job opportunities

11. Design a packet of materials which could introduce other students to the occupation chosen in the area of forestry. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number ten could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered and to give additional information.

12. Compare the forestry occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

FORESTRY

Products and By-Products: The principal activities are concerned with putting wood into a more useful and convenient form. This includes separating and staking logs; cutting them into proper lengths, widths, and thicknesses; debarking, peeling, clipping, drying, gluing, cutting into sheets, sanding, grading, stamping, packing, and transporting to supply wholesalers and distributors; and gathering and/or collecting various by-products from the trees.

OCCUPATION	D.O.T.
Pulp buyer	162.158
Log and pulp scaler	941.487
Conservation aide technician	040.081
Superintendent	187.168
Warehouse superintendent	184.168
Wood procurement superintendent	180.168
Mill superintendent	669.137
General warehouse supervisor	223.138
Supervisor	669.137
Wood marketing foreman	186.168
Plant foreman	183.118
Warehouse foreman	929.139
Dry kiln foreman	563.381
Plant manager	180.168
Process inspector	619.130
Plant engineer	007.187
Quality control	012.168
Broker	162.158
Saw mill equipment operator	409.883
Kiln operator	563.381
Machine man	539.130
Verneer operator	663.885
Crane operator	921.280
Checker-scaler	940.137
Grader	669.587
Debarker operator	922.887
Mill employee	667.782
Wood technologist	040.081
Gum gatherer	442.887
Gum grader	442.887
Sugar tapper (maple-syrup maker)	442.887
Sap collector	442.887
Greenspicker	442.887
Greenstier	442.887
Moss cutter	429.887
Moss handler	406.887
Moss picker	442.887
Resin gatherer	442.887
Turpentine gatherer	442.887
Lumber inspector and/or grader	669.587

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a student or group can make a list of the principal activities of a person concerned with the products and by-products of forests. Listed should be special aptitudes and skills needed for this type of work. A forestry dictionary should be kept to record major vocabulary words used in this area. A crossword puzzle could be compiled, using some of the most important words. Also, special tools used in this area should be noted.

1. Make an attractive bulletin board of questions about trees and their by-products. Which trees supply materials for making candles, sugar, latex, cold drinks, medicines, spices for cooking, and Christmas wreaths. Also, have a list of workers associated with each and see if the class can match tree and worker.

2. Visit a paper mill or write to a paper company for its brochures. Write a story about "A World Without Paper."

3. Find out how timber is sold and what buyers look for in timber. Advertise timber and sell it to the highest bidder.

4. Build a bird house, planter, or some object from wood. What are other uses of wood? What types of wood are used for furniture, fence posts, plywood, Christmas trees, etc.?

5. Make a product map showing where different kinds of wood are found.

6. Find out about waste products after wood is sawed. What use is made of sawdust and chipped wood? Find out how it was used in the past and if any new uses have been developed.

7. Prepare a talk on gum. Pass out a stick of gum to each classmate and ask how many know how gum is made.

8. Try to invent a new use for wood.

9. Visit a maple-syrup farm. Watch how the trees are tapped. What time of year is this done? What equipment was used in collecting it? Have some pancakes for breakfast tomorrow morning and use maple syrup. Was the breakfast tasty?

10. Make some sassafras tea and tell the class how to go sassafras hunting and what to look for.

11. Find out how plywood is manufactured. What special tools and equipment are used?

12. Set up a miniature logging operation with toy trains and trucks, Lincoln logs, miniature trees, etc. Explain its operation to classmates.

13. Make a bulletin board picturing various tools and equipment used in the production of lumber or the gathering of its by-products.

14. Lead a panel discussion on the importance of ecology and/or environmental protection in forestry.

15. It takes about seventeen large trees to produce a ton of paper. Empty the class wastepaper basket each day and weigh the amount of paper. At the end of the week, total the amount and divide by five giving the average daily consumption of paper. Then multiply this amount of 180 school days to find out how many pounds of paper (or tons) the room uses a year. Figure how many trees it would take to supply that amount. Find out how much wood is used per person.

16. Select one of the forestry occupations suggested and research it. If possible, interview someone in this area. Gather the following information from the interviewee and any reference material available:

a. Special skills and aptitudes required
b. Educational requirements
c. Working conditions and setting
d. Employment possibilities
e. Related interests of interviewee which may have affected his career choice
f. Summer or seasonal job opportunities

17. Design a packet of materials which could introduce other students to the occupation chosen in the area of forestry. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number sixteen could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered and to give additional information.

18. Compare the forestry occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

REFERENCES FOR ADDITIONAL INFORMATION

General:

Books

Atwater, Montgomery M. The Forest Rangers. Smith, 1969.
Brooks, Anita. The Picture Book of Timber. John Day, 1967.
Buehre, Walter. Timber! Farming our Forest. Morrow, 1960. illus.
Collingwood, G. H. Knowing Your Trees. American Foresty Association. 1964. 349 p. illus. maps.
Coombs, Charles I. High Timber; the Story of American Forestry. World, 1960. illus.
Crockett, James Underwood. Trees. Silver Burdett/Time-Life, 1972.
Dudley, Ruth H. Our American Trees. Crowell, 1956. 147 p. illus.
Farb, Peter. The Forest. Time-Life Books. Time, 1963.
Hanaburgh, David H. Your Future in Forestry. Richards Rosen, 1961.
Knauth, Percy. The North Woods. Silver Burdett/Time-Life, 1972. illus.
Perry, John. Foresters and What They Do. Watts, 1963.
Selsam, Millicent E. Birth of a Forest. Harper, 1964. illus.
Careers for Foresters and Wood Scientists. University of Illinois, Department of Forestry, Urbana, Illinois.
Challenge in Wood Research. U. S. Department of Agriculture.
Opportunities Unlimited for Careers of Prestige and Profit in the Forest Products Industry. National Lumber Manufacturers Association, Washington, D. C.

Audio-Visuals

Lumber. Bailey Films, 1960. filmstrip.
Opportunities in Logging. Pacific Logging Congress, American Bank Building, 621 S. W. Morrison St., Portland, Oregon 97205. film free.

Organizations

American Forest Institute, Education Division, 1619 Massachusetts Avenue, N. W. Washington, D. C. 20036.
Forest Service United States Department of Agriculture. 1621 North Kent St., Arlington, Virginia 20415.
Southern Forest Institute, One Corporate Square, N. E. Suite 280, Atlanta, Georgia.
State Departments of Forests and Waters (located in each state).
United States Department of Agriculture, Office of Information, Publications Division, Washington, D. C. 20250.

Production and Propagation:

Books

Knapp, Clifford E. Outdoor Activities for Environmental Studies. The Instructor Publications, Inc., Dansville, N. Y. 14437, 1971.
Myers, J. Walter, Jr. The Lessons in Forestry. Louisiana Forestry Commission, Baton Rouge, La., 1972.

Organizations

The American Christmas Tree Council, 342 Madison Ave., N. Y. 17, N. Y.
The American Forestry Association, 1319 18th Street, N. W., Washington, D. C. 20036.
Cooperative Extension Service, College of Agriculture, State University in the area.

Protection:

Books

Ditzel, Paul C. *Firefighting: A New Look in the Old Fire House*. Van Nostrand, 1969. illus.
Seymour, Marjorie. *Nature Study Facts and Activities*. F. A. Owen Publishing Company, Dansville, N. Y., c 1961.
Bibliography of Reading Materials on Forestry and Forestry Careers. Society of American Foresters, 1010 Sixteenth St., N. W., Washington, D. C. 20036.
Forestry Activities; A Guide for Youth Group Leaders. Forest Service, U. S. Department of Agriculture, Washington, D. C., c 1970. PA 457.

Organizations

Defenders of Wildlife, 2000 N. Street, N. W., Washington, D. C. 20036.
Department of Conservation, Division of Forestry of your State.
The National Wildlife Federation, 1412 16th St. N. W., Washington, D. C. 20036.
State Forestry Dept., U. S. Dept. of Agriculture, Washington, D. C.
Wildlife Management Institute, Wire Building, Washington, D. C. 20005.

Products and By-Products:

Books

The Story of the Redwood Lumber Industry. California Redwood Association, 617 Montgomery St., San Francisco, California 94111.

Audio-Visuals

What's So Special About Paper? Career-guidance film about paper industry narrated by Chet Huntley from the American Paper Institute, color 28 min., free loan film from Modern Talking Picture Service, 2323 New Hyde Park Road, New Hyde Park, N. Y. 11040.

Organizations

American Plywood Association, 1119 A Street, Tacoma, Washington 98401.
Hammermill Paper Co., Educational Services, Erie, Pa. 16512.
Maple-Syrup Farm, Rockville, Indiana.
National Lumber Manufacturing Association, Washington, D. C.
Saint Regis Paper Co., 150 East 42nd St., N. Y., N. Y. 10017.
Southern Forests Products Association, P. O. Box 52468, New Orleans, Louisiana 70150.
Standard Milling Company, P. O. Box 8327, Kansas City, Missouri 64105.
Western Wood Products Association, Yeon Building, Portland, Oregon 97204.

Sources of Specific Occupational Information:

Books

Dictionary of Occupational Titles. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

Occupational Briefs. Chronicle Guidance Publications, Inc., Moravia, N. Y. 13118.

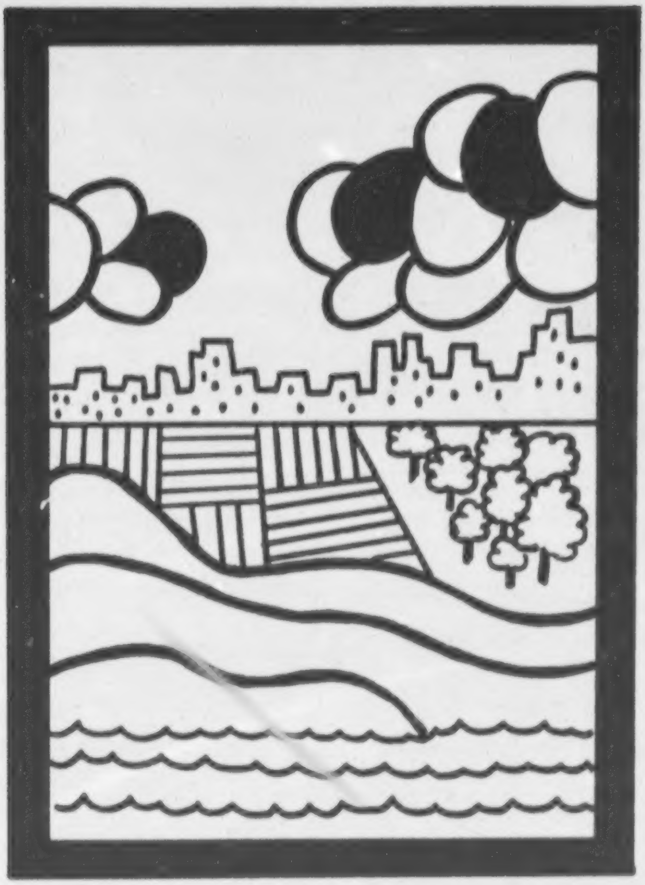
Occupational Briefs. Largo Career Briefs, Largo, Florida.

Occupational Briefs. Science Research Associates, 259 E. Erie St., Chicago, Illinois 60611.

Occupational Outlook Handbook. United States Department of Labor, Bureau of Statistics Supt. of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

MAJOR CAREER DEVELOPMENT DIMENSION

DECISION MAKING



ENVIRONMENTAL PROTECTION

WATER   AIR, NOISE, RADIATION   SOLID WASTES

BEFORE YOU BEGIN

For the convenience of both teacher and student, the materials in this study are divided into three sections. The last of these -- STUDENT ACTIVITIES -- is actually part of the second; it is presented as one piece, however, so that the teacher can easily lift it out, duplicate it, and distribute it to the class.

I. INSTRUCTIONAL INFORMATION

CAREER DEVELOPMENT CONCEPTS. These are the main concepts to be developed in this unit. The teacher should concentrate especially on the DECISION MAKING subconcept *an individual should consider alternative ways to reach a given goal.* This particular concept seems appropriate to the study of occupations in ENVIRONMENTAL PROTECTION. The other five interacting subconcepts further develop other understandings necessary for making career decisions.

INFUSED SUBJECT MATTER. This is a listing of some of the knowledge and skills acquired by this level of education. The subject matter is used in carrying out the student activities.

OCCUPATIONAL INFORMATION. For the benefit of the teacher, the several occupational areas with which the students are working in section three are also outlined here. Specific occupations in each of these areas are listed in the student section.

PUPIL PERFORMANCE OBJECTIVES. The teacher should consider these as the outcomes for the students by the end of the unit.

II. INSTRUCTIONAL ACTIVITIES

INTRODUCTORY ACTIVITIES. These are designed to interest the students in the subject matter of this unit, as well as to provide a controlled means of developing the career development concepts. The last of these activities should lead directly into . . .

INDIVIDUAL AND SMALL GROUP ACTIVITIES. On the basis of the last INTRODUCTORY ACTIVITY, the teacher should group the students into each occupational area and distribute to each group the information and activities for its chosen area (See Section III below). Students in each group can then choose which specific activities they would like to do. These activities are meant to give the student a few "hands-on" experiences with the kind of work encountered in the ENVIRONMENTAL PROTECTION occupations. The teacher is free to develop additional activities which could add to the student's understanding of this unit.

CULMINATION ACTIVITIES. After each individual or small group has completed its activity, the students should be given a chance to share their information. They may want to present their displays,

give their reports, or exchange their career packets for a few days. The teacher should also use the CULMINATION ACTIVITIES suggested.

EVALUATION ACTIVITIES. Some evaluation experiences are provided for the unit. Rather than prescribe formal testing, the materials give a suggestion for evaluating the career development concepts. Because the classroom teacher is the best qualified evaluator in her classroom, she should decide HOW a given knowledge or skill shall be demonstrated and the QUALITY and QUANTITY of knowledge or skill required for a particular child or group of children.

III. STUDENT ACTIVITIES. These activities are to be used by each group and are in the preceding section.

The numbers listed to the right of each occupation are taken from The Dictionary of Occupational Titles (D.O.T.), Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

I. INSTRUCTIONAL INFORMATION

CAREER DEVELOPMENT CONCEPTS

DECISION MAKING

Major Concept	Basic components of the decision-making process can be applied to the establishing of personal goals and the making of career-related decisions.
Subconcept	*An individual should consider alternative ways to reach a given goal.*

ATTITUDES AND APPRECIATIONS

Major Concept	Society is dependent upon the productive work of individuals.
Subconcept	*Completion of a worthwhile task has value for the worker and for society.*

CAREER INFORMATION

Major Concept	Basic career information will aid in making career-related decisions.
Subconcept	*The individual worker determines which aspects of an occupation may be unpleasant or pleasant.*

EDUCATIONAL AWARENESS

Major Concept	Educational skills and experiences are related to the achievement of career goals.
Subconcept	*Career-oriented learning may take place in or out of school.*

SKILL AWARENESS

Major Concept	All occupations require general and specific skills.
Subconcept	*Career plans should be designed and executed with the understanding that evaluation and replanning may be necessary.*

ECONOMIC AWARENESS

Major Concept	Basic economic understanding will aid in making career-related decisions.
Subconcept	*Additional training and experience increase earning potential.*

INFUSED SUBJECT MATTER

Mathematics
1. Estimates
2. Cost
3. Measurements
4. Recording of mathematical data

Language Arts
1. Interviewing
2. Reporting
3. Editing a pamphlet
4. Research skills
5. Letter writing

Science
1. Changes in matter
2. Photosynthesis
3. Organic compounds
4. Ecosystems and ecology
5. Energy transformation
6. Earth cycles - water cycles, sedimentation
7. Electronics
8. Classification
9. Problem solving
10. Comparisons
11. Water purification and transportation systems
12. Diagrams

Social Studies
1. City growth and planning
2. American history
3. Geography

OCCUPATIONAL INFORMATION

Environmental Protection

Occupations in this area are involved in the protection of water, air, and soil, all of which are essential to man's survival, and the elimination or control of man-made elements which are harmful to man and to the environment.

Water: The principal activities deal with engineering ground water systems, sewage systems, water purification plants, and waste water treatment plants; studying the sources and effects of all water pollution; and developing new methods of cleaning polluted water and desalinating sea water.

Air, Noise, Radiation: The principal activities deal with studying the effects of radiation on man, animals, and plants; isolating dangerous quantities of radioactive waste from nuclear power plants; reducing the amount of pollution produced from the internal combustion engine or the burning of industrial fuels;

investigating the effects of airborne fibers insulating buildings; and reducing the sound produced by mechanical devices.

Solid Wastes: The principal activities deal with planning and operating incinerators, land fills, and other disposal processes; regulating garbage pick-up and handling; inventing new biodegradable products for manufacturers; and aiding farmers in disposing of livestock waste.

PUPIL PERFORMANCE OBJECTIVES

DECISION MAKING

. . . list three ways a student may attain his career goals.

ATTITUDES AND APPRECIATIONS

. . . identify a task for which the student is responsible, and in a short paragraph tell why it is important that that task be completed and what its value is to society.

CAREER INFORMATION

. . . identify three tasks which are pleasant and three which are unpleasant.

. . . identify those factors which affect the reasons for identifying these tasks as pleasant or unpleasant.

EDUCATIONAL AWARENESS

. . . list the various experiences outside school which have helped the making of a career decision.

SKILL AWARENESS

. . . write a paragraph concerning the reasons why replanning of career plans may be necessary.

ECONOMIC AWARENESS

. . . list three reasons why earning potential could be increased through additional training and experience.

II. INSTRUCTIONAL ACTIVITIES

The instructional activities have been designed to develop the CAREER DEVELOPMENT CONCEPTS using a variety of subject matter, knowledge and skills, and appropriate occupational information. The teacher may develop additional activities which could add to the student's understanding of this unit.

INTRODUCTORY ACTIVITIES	CAREER DEVELOPMENT CONCEPTS
1. Consider with the class a few items such as a bottle of shampoo, a package of meat, and an electric mixer, all of which must be disposed of when they are consumed or no longer usable. What happens to these materials once they are used? Consider all the possible effects on other people when a person is concerned only with the disposal of a product and not concerned with the environment. What kinds of decisions have they made which affect others directly or indirectly?	*An individual should consider alternative ways to reach a given goal.* **Decision Making**
2. Have the students look at the classroom, school, neighborhood, and community through the eyes of an environmental inspector. They could then list the people whose jobs involve the responsibility of caring for the environment. What are some of their tasks? Do these people consider their tasks important for themselves and society?	*Completion of a worthwhile task has value for the worker and for society.* **Attitudes and Appreciations**
3. Referring to the list made in activity 2, have each student classify the tasks as pleasant or unpleasant. Have the students name some factors which they think influenced their classification.	*The individual worker determines which aspects of an occupation may be unpleasant or pleasant.* **Career Information**
4. Instruct each student to interview someone to find out if additional training and/or experience increased earning potential. In actual fact, did salaries increase? Are there other factors to be considered when reaching for a higher salary? Also, find out if that person ever had to replan his career goal. What were the factors that made these changes necessary?	*Additional training and experience increase earning potential.* **Economic Awareness** *Career plans should be designed and executed with the understanding that evaluation and replanning may be necessary.* **Skill Awareness**
5. Have the students assess their likes and dislikes. General: I care or do not care about the future of our environment; I like or do not like problem solving, gathering data, doing scientific	*The individual worker determines which aspects of an occupation may be unpleasant or pleasant.* **Career Information**

experiments, thinking of new ideas, reading, or writing reports.
Specific: I am or am not interested in recycling water; providing for cleaner recreational areas; reducing noise at home, in schools, or in factories; researching the effects of radiation on humans; and recycling and disposing of solid waste materials.

Use the assessment list developed in the last activity to help each student determine which of the areas listed below he would like to investigate.

SMALL GROUP OR INDIVIDUAL ACTIVITIES

See student pages: Water - p. 205
Air, Noise, Radiation - p. 209
Solid Wastes - p. 213

CULMINATION ACTIVITIES

1. Compile a history of the occupations in the community using information gathered from interviews. What changes in the community have either created new occupations or changed those already existing? How have environmental discoveries and concerns affected these occupations? What changes can the students predict for the future?

Career plans should be designed and executed with the understanding that evaluation and replanning may be necessary.

Skill Awareness

2. Have each group select a particular problem in their area of study (water, solid waste, or air, noise, and radiation) and then propose a solution to it. Does this solution create problems? Work out alternative solutions.

An individual should consider alternative ways to reach a given goal.

Decision Making

3. Have the students compile a list of all the things the homeowner could do to reduce the kinds of pollution each group has been studying. They could make an attractive and readable pamphlet which incorporates the class recommendations. What historical information and

Completion of a worthwhile task has value for the worker and for society.

Attitudes and Appreciations

scientific information could be included? Print enough copies for circulation in the neighborhood. How can it be determined whether or not people are following the suggestions?

4. Have each student consider any occupation in which he is interested to see if there are any aspects of that career which are concerned with environmental protection. He could list some of the ways that he, as an individual, could show (by actions) his own concern for his environment.

Completion of a worthwhile task has value for the worker and for society.

Attitudes and Appreciations

EVALUATION

Have each group share the information received via interviews concerning the alternatives that the interviewee could have taken to reach his career goal. Have each individual identify a tentative career choice and list at least three alternatives available to him to reach his goal

RESOURCES

See "References for Additional Information" page.

III. STUDENT ACTIVITIES

ENVIRONMENTAL PROTECTION

Water: The principal activities deal with engineering ground water systems, sewage systems, water purification plants, and waste water treatment plants; studying the sources and effects of all water pollution; and developing new methods of cleaning polluted water and desalinating sea water.

OCCUPATION	D.O.T.
Estuarine oceanographer	024.081
Ground water hydrologist	024.081
Water systems foreman	862.138
Watershed manager	954.782
Aquatic biologist	041.081
Nuclear engineer	015.081
Oceanographer	024.081
Water treatment plant superintendent	005.168
Water treatment plant maintenance mechanic	630.281
Water treatment plant chemist	022.281
Water treatment plant laboratory technician	022.281
Water treatment plant shift foreman	862.138
Water treatment plant operator	954.782
Limnologist	041.081
Biochemist	041.081
Biophysicist	041.081
Microbiologist	041.081
Botanist	041.081
Analytical chemist	022.081
Inorganic chemist	022.281
Organic chemist	022.081
Field health officer	168.168
Civil engineer	005.081
Assistant superintendent	184.168
Operations supervisor	954.782
Shift foreman	862.138
Maintenance supervisor	891.138
Mechanical maintenance foreman	638.131
Maintenance helper	899.281
Chemist	022.281
Laboratory technician	022.281
Waste water technician	012.168
Operator aide	955.885
Civil engineer	005.081
Environmental inspector	003.281

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a list of activities of a person engaged in this type of work can be made. Every human affects the environment at home, at school, on the job, and during his leisure. Some of the ways individuals show concern or lack of concern for the environment in relation to water should be noted.

1. Go to the local water department or city engineer and gather the following information:

    a. Where does the community water come from? Locate its source on a map.
    b. Is it polluted by other communities, and, if so, which ones? Is it polluted by any particular industries?
    c. Is there enough for the next 10 years?
    d. How is it purified?

2. Learn to read a water meter. How much water does a person use in a day; a week? Could less be used? How? What inventions encourage us to use more water?

3. Do some research on ancient water systems (Roman aqueducts, etc.). Make a display, using bricks, boxes, old pipes, and other handy items, of the system found to be most ingenious. Compare this system with the community's system.

4. Set up two tanks of fresh water and place them near the light. Put some fresh water plants and algae into each of them. Pour a small quantity of detergent containing phosphates into one of the tanks. After a period of time, compare the two tanks. Is there more algae in one than in the other? Why? Research the function of algae in aquatic environments.

5. Record the amounts and kinds of detergents used at home in a day for such jobs as washing floors, scouring tubs, and laundering clothes. Does the family use detergents containing a large amount of phosphates? Suggest washing products be changed. What is the reaction? How can a decision be made to change cleaning products? What are some substitutes for other detergents?

6. Go to the local waste water treatment plant and gather the following information:

    a. Where does the waste water come from, and how is it channelled to the plant?
    b. Why and how is it treated? Does the plant have both primary and secondary treatments? If not, why?
    c. Where does the treated water go?

7. How do flood waters affect the environment? Devise some flood control measures. If there is a dam in the area, visit it, and have the manager explain how the dam serves the community. If the area is subject to floods or heavy rains, ask the local water department or city engineer how these waters are controlled.

8. Discuss which is better and why:

   a. Salt or sand on winter streets.
   b. Soap or detergent in washing machines.
   c. Pesticides or natural predators for plants.

Trace all the consequences of each choice. How was the conclusion reached? If there is a choice to use either method, how will a decision be made? Interview some people to find out how they decided which to use.

9. Visit a home in the suburbs or the country that uses a septic tank, and find out how it operates. Ask several people living outside the city limits how they get their water. Do they conserve their water more than people inside the city limits? Why? How can you get people within the city limits to conserve in the same way?

10. Do a study of the sanitary habits of people of other times or places. Compare these with American sanitary habits. On the basis of these findings, judge whether Americans need to use as much water as they do. Could we be less sanitary and still remain healthy?

11. Take a trip on water, if possible, and record how many different kinds of pollution are in the water. How do marine vessels pollute? What kinds of decisions might a sports fisherman or owner of an industry make if he is concerned with the environment? Talk to the captain of an oil tanker. What maneuvering problems does he have? How does he try to eliminate all incidents that might cause oil spills?

12. Set up a waste purification system with the aid of the science teacher and run some polluted water through it. How does the system compare with the community's purification system.

13. Select one of the environmental occupations in the area and research it. If possible, interview someone in this occupation. Gather the following information:

   a. Necessary skills and aptitudes required
   b. Educational requirements
   c. Working conditions and setting
   d. Employment possibilities
   e. Government and community decisions that have affected the job
   f. Community needs which have created the job
   g. The date the occupational setting was constructed
   h. Alternate ways to reach a career goal
   i. Factors which determine which aspects of an occupation are unpleasant or pleasant
   j. Replanning of careers - how, what, why?
   k. Effect of additional training and experience upon earning potential

14. Design a packet of materials which could introduce other students to the environmental occupation chosen. Include pictures of people at their work, the equipment they use, and their work setting. Information

gathered in activity number thirteen could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered and to give additional information.

15. Compare the environmental occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

ENVIRONMENTAL PROTECTION

Air, Noise, Radiation: The principal activities deal with studying the effects of radiation on man, animals, and plants; isolating dangerous quantities of radioactive waste from nuclear power plants; reducing the amount of pollution produced from the internal combustion engine or the burning of industrial fuels; investigating the effects of airborne fibers insulating buildings; and reducing the sound produced by mechanical devices.

OCCUPATION	D.O.T.
Radiological health specialist	199.485
Radiological health technician (monitor)	199.187
Radiological pollution control technician	012.168
Air pollution control director	012.168
Air pollution control supervisor	012.168
Air pollution control chemist	022.081
Air pollution control engineer	012.088
Air pollution control meteorologist	025.288
Air pollution control specialist	096.168
Air pollution control inspector	609.684
Air pollution control technician	029.281
Air pollution control aide	012.168
Noise pollution control technician	012.168
Incinerator foreman	955.130
Incinerator operator	955.782
Meteorologist	025.088
Meteorological aide	025.288
Combustion engineer	008.081
Air analyst (air tester)	012.281
Climatologist	025.088
Power plant operator	952.782
Power plant engineer	952.782
Nuclear engineer	015.081
Industrial engineer	012.188
Engineering aide	012.168
Environmental inspector	003.281

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a list of activities of a person engaged in this type of work can be made. Every human affects the environment at home, at school, on the job, and during his leisure. Some of the ways individuals show concern or lack of concern for the environment in relation to air should be noted.

1. Do some research on the qulity of the air in the region. Write to the air quality control regional officer for some information. What are the chief causes of air pollution in the area?

2. Put some baby oil on a glass of water. At the end of the day, note its color and the particles clinging to it. Repeat this experiment in different sections of the community.

3. Study the public transportation in the community. How efficient are the buses and trains? How attractive are the stations? How much are they used? If there is a choice of public or private transportation, which would be chosen? Why? Which decision would improve the environment? How? Should the decision be made to serve an individual or to serve the public?

4. For a period of about four days, note each time someone in the family uses the car. Find out their purpose and their destination. Make a separate list for each day, and consider the following:

   a. Could several trips have been combined?
   b. Could a bus have been used instead?
   c. Could any have walked or used a bicycle?

In each case, ask why these alternatives were not taken, and, if taken, what the decisions would have involved. What new habits would have to be formed? Would one get more done at the end of the day, or less? How does a person decide which is more important, speed or effects on the environment?

5. Study the electrical appliances in the home. Pick one and suggest a good substitute which doesn't require electricity. Make a display showing the differences in construction, handling, and performance of the two models. Use some historical information as well. Go to the library and find old catalogues showing how the appliance has changed over the years, or make a study of lighting arrangements in this country before electricity. How does using appliances affect the environment? Why is it important to conserve electricity? List ways the family could conserve more electricity.

6. Ask someone to explain the exhaust system of a car. Imagine being an inventor and decide what to invent to help curb auto pollution. What environmental effects would the invention have?

7. Make a diagram of the house and locate all the sound-producing equipment. Could any of these be quieted or eliminated? Give suggestions. How can friends be encouraged to reduce noise pollution? What kinds of difficult decisions would have to be made?

8. Take out all the rugs and curtains in a room and turn on a vacuum sweeper. Put back the rugs and curtains and turn it on again. What decisions should be made in decorating a room to improve the environment?

9. Tape record the sounds in a number of high level noise areas such as the gym, kitchen, restaurant, or shop. Analyze which sounds are most disturbing to the ear. How does the body react when exposed to these sounds for a long period of time? Why?

10. Compare a family-owned lawn mower or vacuum sweeper with ones seen in other homes. Which models produce the most noise? Write the president of the company that is the greatest offender and suggest solutions. Study the response. Ask neighbors why they buy noisy machines. Some people think noise means power; how could this idea be corrected?

11. Find out in what ways small cars are better for the environment than large cars. Interview someone who owns a large car, and ask him why he owns it. How could he be interested in owning a small car? Do a similar study on motorcycles. What kinds of pollution do they cause? How do they compare with cars? Why do people buy motorcycles? How could someone be convinced to ride a bicycle instead?

12. Select one of the environmental occupations in the area and study it. If possible, interview someone in this occupation. Gather the following information:

a. Necessary skills and aptitudes required
b. Educational requirements
c. Working conditions and setting
d. Employment possibilities
e. Government and community decisions that have affected the job
f. Community needs which have created the job
g. The date the occupational setting was constructed
h. Alternate ways to reach a career goal
i. Factors which determine which aspects of an occupation are unpleasant or pleasant
j. Replanning of careers - how, what, why?
k. Effect of additional training and experience upon earning potential

13. Design a packet of materials which could introduce other students to the environmental occupation chosen. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number twelve could be recorded on cassette tapes to accompany the pictures and pamphlets that have been gathered and to give additional information.

14. Compare the environmental occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

ENVIRONMENTAL PROTECTION

Solid Wastes: The principal activities deal with planning and operating incinerators, land fills, and other disposal processes; regulating garbage pick-up and handling; inventing new biodegradable products for manufacturers; and aiding farmers in disposing of livestock waste.

OCCUPATION	D.O.T.
Sanitary engineer	005.081
Sanitarian	168.287
Refuse collector	909.887
Solid waste disposal operator	955.780
Field health officer	168.168
Civil engineer	005.081
Organic chemist	022.081
Biochemist	041.081
Health physicist	079.021
Environmental inspector	003.281

SMALL GROUP OR INDIVIDUAL ACTIVITIES

As this area is explored, a list of activities of a person engaged in this type of work can be made. Every human affects the environment at home, at school, on the job, and during his leisure. Some of the ways individuals show concern or lack of concern for the environment in relation to solid waste should be noted.

1. Find out how the trash in the community is disposed -- by open dump (now illegal), incineration, or land fill. What improvements should be made? Report on the community's disposal system to the class.

2. Find out how the community farms or highway department dispose of their dead animals, and make a report to the class.

3. Ask a farmer how he disposes of waste from his livestock. Has he changed his methods of disposal from twenty years ago? Why did he make the change?

4. Inquire at several industries or shops in the community to find out what their principal waste products are and how they dispose of them.

5. Find out from the community garbage companies how many homes have a garbage pick-up, and compare this figure with the number of homes in the community. What probably happens to the garbage which is not picked up by the city? Interview some people who have garbage pick-up. Find out how many in a given area know where it goes. From this figure, estimate how many people in the entire community are knowledgeable about their garbage disposal.

6. Visit the local reclamation center for recyclable items such as tin cans, paper, and glass. Obtain the following information:

a. How does one set up these operations?
b. How are they financed?
c. How good is public response?
d. Where are the collected items sent?
e. Exactly which products are recyclable?
f. How can citizens help?

7. Gather all the things personally thrown away in the course of a day into a bag and weigh it. Determine how much trash is personally contributed to the world in a year and how much the class contributes. Could the amount of waste be decreased? What decisions would have to be made? How would these decisions affect lifestyle?

8. Gather a pile of used paper, boxes, and other items and see how much can be compacted by putting some objects into others, flattening other objects, and so forth. Ask at home if this could be done every day with the trash. What are the reactions? Construct attractive containers for old glass bottles, tin cans, and paper. Find a place to put these and suggest that the family begin using them. What are their reactions? If they listen, what kinds of decisions would they have to make?

9. Pick one product such as cheese and record how many different ways it is packaged. Decide which packaging is most attractive and/or convenient for the buyer. Which kind of packaging probably creates the largest disposal problem? If the manufacturer simplified his packaging, would he lose customers? How could he solve this problem? Will these decisions help solve the problem of waste disposal?

10. Make a list of paper products used in the home and suggest substitutes for each (paper napkins/cloth napkins). Does every substitute eliminate the problem of disposal, or simply create other pollution problems? Trace all the possible consequences of each decision (washing cloth napkins requires detergent, which pollutes the water, and power, which pollutes the air). In each case, think of ways to solve these secondary problems.

11. Select one of the environmental occupation in the area and research it. If possible, interview someone in this occupation. Gather the following information:

a. Necessary skills and aptitudes required
b. Educational requirements
c. Working conditions and setting
d. Employment possibilities
e. Government and community decisions that have affected the job
f. Community needs which have created the job
g. The date the occupational setting was constructed
h. Alternate ways to reach a career goal
i. Factors which determine which aspects of an occupation are unpleasant or pleasant

j. Replanning of careers -- how, what, why?
k. Effect of additional training and experience upon earning potential

12. Design a packet of materials which could introduce other students to the environmental occupation chosen. Include pictures of people at their work, the equipment they use, and their work setting. Information gathered in activity number eleven could be recorded on cassette tapes to accompany the pictures and pamphlets [illegible] have been gathered and to give additional information.

13. Compare the environmental occupation chosen with any other interesting occupation. What educational requirements, skills, settings, and other characteristics are common to both?

REFERENCES FOR ADDITIONAL INFORMATION

General:

Books

Aylesworth, Thomas G. *This Vital Air, This Vital Water; Man's Environmental Crisis*. Rand, 1968. illus.

Fanning, Odom. *Opportunities in Environmental Careers*. Universal, 1971.

Halacy, D. S. *Now or Never; The Fight Against Pollution*. Four Winds, 1971.

Hyde, Margaret O. *For Pollution Fighters Only*. McGraw, 1971. illus.

Kavaler, Lucy. *Dangerous Air*. John Day, 1967. illus.

McCoy, J. J. *Shadows Over the Land*. Seabury, 1969.

Percivall, Julia. *Household Ecology*. Prentice-Hall, 1972.

Perry, John. *Our Polluted World; Can Man Survive?* Watts, rev. ed. 1972.

Audio-Visuals

Jackson, Daniel F. and Bettina B. *Environmental Pollution : Our World in Crisis*. Wards, 1969.

Nirk, Brian A. *Ecology and The Study of Pollution*. Visual Materials, Inc., 1971. transparency.

Schaap, Walter E. *Ecology : Can Man and Nature Coexist?* Current Affairs Films, 1970. filmstrip.

Man - Hero or Villian. Jim Handy/Scott Education, 1971.

Organizations

Union Oil Co., Box 7600, Los Angeles, California 90054.

United States Department of Health, Education & Welfare, Environmental Health Service, Washington, D. C.

United States Environmental Protection Agency, Washington, D. C. 20460.

Water:

Books

Rondieu, Pierre. *Purity or Pollution; The Struggle for Water*. Watts, 1971.

Organizations

American Waterworks Association, 2 Park Avenue, New York 16, New York.

Hammermill Paper Co., Erie, Pennsylvania 16512.

National Canners Association, 1133 20th Street N. W., Washington, D. C. 20003.

Water Pollution Control Federation, 3900 Wisconsin Avenue, Washington, D. C. 20016.

Air, Noise, Radiation:

Books

Herber, Lewis. *Crisis in Our Cities*. Prentice, 1965.

Kavaler, Lucy. *Dangerous Air*. John Day, 1967. illus.

Millard, Reed. *Clean Air - Clean Water for Tommorrow's World*. Prentice, 1965.

Organizations

United States Atomic Energy Commission Technical Information, P. O. Box 62, Oak Ridge, Tennessee 37830.

Solid Wastes:

Books

Hilton, Suzanne. How Do They Get Rid of It? Westminister, 1970.

Organizations

The Aluminum Association, 750 Third Avenue, New York, New York 10017.
Concern, Inc., 2233 Wisconsin Avenue N. W., Washington, D. C. 20007.
Hammermill Paper Company, Eire, Pennsylvania 16512.

Sources of Specific Occupational Information:

Dictionary of Occupational Titles. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.
Occupational Briefs. Chronicle Guidance Publications, Inc. Moravia, N. Y. 13118.
Occupational Briefs. Largo Career Briefs. Largo, Florida.
Occupational Briefs. Science Research Associates, 259 E. Erie St., Chicago, Illinois 60611.
Occupational Outlook Handbook. United States Department of Labor, Bureau of Statistics, Supt. of Documents, U. S. Gov. Printing Office, Washington, D. C. 20402.

APPENDICES

APPENDIX A

AGRICULTURAL:

DEFINITIONS

AREAS FOR INVESTIGATION

OCCUPATIONS

I. AGRICULTURAL PRODUCTION

Agricultural production is the growing of crops or raising of livestock for the purpose of increasing the quantity of quality products and offering those crops, livestock, or products for sale. High agricultural production requires people with a high degree of knowledge and skill in the plant or animal sciences, and/or business management.

Animal Production: The principal activities deal with the quantity production of quality food and non-food needs for humans and other animals, as well as with the improvement of production practices by better breeding, feeding, and management techniques.

Areas for investigation:

1. Selecting livestock
2. Breeding livestock
3. Feeding livestock
4. Maintaining animal health
5. Marketing livestock
6. Housing livestock

Plant Production: The principal activities deal with the quantity production of quality food and non-food needs for humans and other animals, as well as with the improvement of production practices by better seed selection; fertilizing programs; and planting, cultivating, and harvesting techniques.

Areas for investigation:

1. Seed and plant selection
2. Planting farm crops
3. Plant nutrition
4. Soil tillage
5. Plant pest control
6. Harvesting farm crops
7. Marketing farm crops

Mechanics: The principal activities deal with the purchasing, operating, and maintaining of general and specialized equipment. (This area will be developed in the module entitled "Agricultural Mechanics.")

Areas for investigation:

1. Types and uses of power in agriculture
2. Operation and repair of agricultural machinery and equipment
3. Construction and maintenance of structures
4. Electrification

Agricultural Business Management: The principal activities deal with budgeting (accounting), financing, managing, marketing, purchasing, personnel management, and economics.

Areas for investigation:

1. Farm planning
2. Financial and legal protection
3. Farm personnel management

The following occupations were developed into Teaching Modules for this guide:

Truck Farmer - Primary
Livestock Producer - Intermediate

The following occupations could be developed into Teaching Modules:

1. Cattle producer
2. Sheep rancher
3. Wool buyer
4. Veterinarian
5. Swine farmer
6. Livestock marketing specialists
7. Livestock buyer
8. Farm adviser
9. Animal groomer
10. Animal geneticist
11. Kennel operator
12. Poultry farmer
13. Horse farm manager
14. Farrier
15. Horseman, show
16. Tenant farmer
17. Farm laborer
18. Sharecropper
19. Grain or forage farmer
20. Plant pathologist
21. Broker & market reporter
22. Farm appraiser
23. Plant geneticist
24. Soil scientist
25. Soil conservationist
26. Seed grower
27. Truck farmer
28. Fruit farmer
29. Orchardist
30. Agronomist
31. Rice farmer
32. Cotton farmer
33. Sugar beet farmer
34. Grain elevator manager
35. Custom farm operator
36. Fish farmer
37. Laboratory animal producer
38. Farm manager
39. Agricultural consultant (Bank)

II. AGRICULTURAL SUPPLIES AND SERVICES

This occupational area is concerned with the production, processing, distribution, and use of consumable supplies used by the agricultural producer in the production of animals, plants, and their products. This area also includes services such as research, instruction, and application of materials as needed in the use of those supplies.

Feeds: The principal activities deal with preparing, selling, and researching feeds and feedstuffs and with providing quality control.

Areas for investigation:

1. Formulating rations
2. Preparing feed
3. Feed additives
4. Utilization of nutrients by animals

Chemicals: The principal activities deal with researching, inspecting, distributing, and marketing of chemicals; with operating equipment used in application of chemicals; and with providing instruction as to their use.

Areas of investigation:

1. Chemicals and agricultural problems
2. Safe handling of chemicals
3. Laws and regulations
4. Application of chemicals
5. Research

Fertilizers: The principal activities deal with the mixing, blending, inspecting, marketing, and researching of fertilizers; making soil analyses; and applying chemical elements to the soil.

Areas for investigation:

1. Storage and handling of fertilizers
2. Soil tests to determine fertilizer and lime needs
3. Regulations and controls
4. Application of fertilizers

Seeds: The principal activities deal with cleaning, grading, inspecting, testing, researching, and marketing of seeds.

Areas for investigation:

1. Production
2. Quality control
3. Storing and handling
4. Distribution

The following occupations were developed into Teaching Modules for this guide:

Agronomist - Primary
Feed Sales Personnel - Intermediate

The following occupations could be developed into Teaching Modules:

1. Feed grinder
2. Feed mill superintendent
3. Feed sales manager
4. Feed company credit manager
5. Feed store sales personnel
6. Grain mill products inspector
7. Grain elevator operator
8. Mixer and blender operator
9. Formulation specialist
10. Fertilizer sales personnel
11. Fertilizer plant manager
12. Anhydrous ammonia inspector
13. Agricultural chemist
14. Seed cleaner operator
15. Seed sales personnel
16. Seed inspector
17. Geneticist
18. Seed analyst
19. Agricultural chemical equipment manager
20. Aerial spray operator
21. Agricultural chemical sales personnel
22. Agricultural chemical inspector
23. Weed abatement foreman
24. Agricultural extension specialist
25. Plant pathologist
26. Agricultural supply store manager
27. Custom applicator (chemicals, fertilizers, etc.)
28. Feed mill worker
29. Veterinarian
30. Agricultural teacher
31. County extension agent

III. AGRICULTURAL EQUIPMENT AND MECHANICS

Agricultural equipment and mechanics is the developing of new and improved agricultural equipment and structures, their operation and maintenance; the solving of soil and water problems; the designing and supervising of irrigation systems; and the designing and using of various power systems.

Power, Machinery, and Tools: The principal activities in this area deal with the gaining and using of knowledge and skills for the purchase, operation, and maintenance of agricultural equipment; selling, servicing, and repairing of agricultural equipment and parts; and the development or improvement of agricultural equipment.

Areas for investigation:

1. Engines
2. Design, assembly, adjustment, and/or repair of agricultural equipment

Agricultural Structures: The principal activities in this area deal with the design, construction, and maintenance of agricultural structures.

Areas for investigation:

1. Determination of structure requirements
2. Design
3. Construction
4. Installation of water, ventilation, and protection systems
5. Maintenance

Soil and Water Management: The principal activities in this area deal with designing and constructing water and soil management structures.

Areas for investigation:

1. Surveying
2. Erosion
3. Drainage
4. Farm ponds
5. Irrigation systems

Electrification: The principal activities in this area deal with the gaining of knowledge of the principles of electricity and applying those principles as related to the design, operation, and maintenance of agricultural structures and equipment.

Areas for investigation:

1. Selecting electrical systems
2. Installing and servicing electrical systems
3. Servicing and repairing electrical motors

The following occupations were developed into Teaching Modules for this guide:

Farm Equipment Mechanic - Primary
Irrigation Engineer - Intermediate

The following occupations could be developed into Teaching Modules:

1. Agricultural equipment dealer
2. Agricultural equipment sales manager
3. Agricultural equipment sales personnel
4. Agricultural parts sales personnel
5. Agricultural engineer
6. Agricultural equipment service representative
7. Agricultural equipment mechanic
8. Agricultural equipment inspector and tester
9. Agricultural equipment systems specialist
10. Agricultural equipment operator
11. Agricultural building specialist
12. Agricultural building components sales personnel
13. Agricultural building ventilation and insulation technician
14. Irrigation engineer
15. Soil scientist
16. Irrigation district manager
17. Soil biologist
18. Soil testing technician
19. Soil conservationist
20. Surveyor
21. Agricultural engineer
22. Electrician
23. Public utilities sales personnel
24. Agricultural machinery operator
25. Agricultural machinery set up man
26. Agricultural mechanics teacher

IV. AGRICULTURAL PRODUCTS (FOOD PROCESSING)

The location of the bulk of the processing industry in or close to production areas highlights the fact that food processing is essentially an agricultural industry. By converting the farmer's perishable crops into more usable form, the processing industry has eliminated the waste that would otherwise result from seasonal gluts and has made these perishable crops available to the consumer year-round.

Dairy Processing: The principal activities may be divided according to three general types of dairy plants. One type deals primarily with fluid milk and some fluid milk by-products. The second type of plant makes ice cream or ice cream mix. The third type manufactures butter, cheese, nonfat dry milk, condensed milk, or other products.

Areas of investigation:

1. Receiving
2. Sanitation
3. Processing
4. Storing and shipping
5. Equipment
6. Inspection
7. Distribution

Meat Processing: The principal activities deal with slaughtering poultry, fish, and livestock; dressing, curing, processing, packaging, and canning meat; storing meat and meat products; and distributing and selling meat and meat products.

Areas of investigation:

1. Sanitation
2. Processing
3. Storing and shipping
4. Equipment
5. Identification of cuts
6. Inspection
7. Distribution

Fruits, Vegetables, and Nuts: The principal activities deal with washing the products; inspecting for foreign or damaged materials; trimming or peeling products; processing these products by canning, freezing, or drying; labeling; and distributing the product to the consumer.

Areas of investigation:

1. Sanitation
2. Inspecting
3. Sorting

4. Grading
5. Canning, freezing, or drying
6. Storing
7. Distribution

Other Products: The principal activities deal with the processing of raw materials such as cotton, tobacco, wool, furs, or grain which are then sold to manufacturers to be made into a variety of finished products.

Areas of investigation:

1. Inspecting
2. Sorting
3. Grading
4. Storing
5. Marketing

The following occupations were developed into Teaching Modules for this guide:

Peanut Butter Maker - Primary
Cheese Maker - Intermediate

The following occupations could be developed into Teaching Modules:

1. Milk sampler
2. Clarifier
3. Dairy plant engineer
4. Dairy tester
5. Butter maker
6. Ice cream maker
7. Dried, condensed and evaporated milk plant manager
8. Offal man
9. Foreman of a cured-meat packing plant
10. Meat inspector
11. Meat grader
12. Final dressing inspector
13. Animal eviscerator
14. Blancher operator
15. Batch freezer operator
16. Egg processing plant mgr.
17. Cannery worker
18. Nut roaster
19. Rice miller
20. Drier (yeast)
21. Gelatin plant foreman
22. Wheat cleaner (cereal)
23. Sugar refining foreman
24. Egg washing machine operator
25. Egg breaker
26. Egg candler
27. Grain sampler
28. Laboratory technician
29. Livestock buyer
30. Butcher
31. Poultry inspector
32. Produce buyer
33. Salesman, raw wool
34. Wool-fleece grader
35. Tobacco buyer
36. Maple sugar maker
37. Honey grader and blender
38. Smoker
39. Pickler
40. Cotton classifier
41. USDA inspector

V. ORNAMENTAL HORTICULTURE

Ornamental Horticulture deals with the culture, production, and maintenance of plants; the establishment, maintenance, and management of Ornamental Horticulture enterprises; the principles and practices involved in locating, planting, and maintaining turf, plants, and shrubs; and the selection and placement of nonliving materials for the beautification of the indoor and outdoor environment.

Arboriculture: The principal activities in this field deal with the cultivation and maintenance of trees and shrubs especially for ornamentation.

Areas for investigation:

1. Tree selection and identification
2. Propagation
3. Planting
4. Equipment
5. Diagnosis and treatment of trees
6. Tree design

Floriculture: The principal activities in this field deal with the cultivation and management of ornamental and flowering plants.

Areas for investigation:

1. Floral plant selection and identification
2. Planting media
3. Fertilizers and application
4. Plant propagation
5. Insect and disease control
6. Floral design

Green House Operation and Management: The principal activities in this field deal with the management and operation of an enclosure for the protection and cultivation of plants.

Areas for investigation:

1. Establishment and maintenance of greenhouse conditions
2. Structure design
3. Controlled growth of plants
4. Management techniques

Landscaping: The principal activity in this field deals with rearranging and modifying the effects of natural scenery over a tract of land for aesthetic effect.

Areas for investigation:

1. Design
2. Site preparation
3. Plant selection
4. Planting
5. Maintenance

Nursery Operation and Management: The principal activities in this field deal with the growing, developing, and marketing of trees, shrubs, and other ornamental plants for the beautification and improvement of our environment.

Areas for investigation:

1. Identification, selection, planting and transplanting stock
2. Soil preparation
3. Grafting and budding
4. Pruning
5. Equipment
6. Shipping

Turf Management: The principal activities in this field deal with the management and growth of grasses to be used for turf.

Areas for investigation:

1. Seed selection
2. Growing of turf
3. Transplanting of turf
4. Mowing, watering, and fertilizing turf
5. Insect, disease, and weed control
6. Recreational turf areas

The following occupations were developed into Teaching Modules for this guide:

Florist - Primary
Greenskeeper - Intermediate

The following occupations could be developed into Teaching Modules:

1. Arborist
2. Ornamental horticulturist
3. Plant breeder
4. Horticulture teacher
5. Arboretum foreman
6. Park foreman
7. Tree service department manager
8. Tree pruner
9. Tree budder

10. Tree planter
11. Tree sprayer
12. Tree remover
13. Tree climber
14. Florist
15. Flowershop manager
16. Floral designer
17. Flower grower
18. Greenhouse employee
19. Plant propagationist
20. Greenhouse manager
21. Landscape architect
22. Cemetery superintendent
23. Landscape nurseryman
24. Pest control specialist
25. Campground landscaper
26. Landscape gardener
27. Nursery manager
28. Nursery sales personnel
29. Nursery shipping clerk
30. Plant pathologist
31. Plant geneticist
32. Golf course superintendent
33. Turf production manager
34. Sod sales personnel
35. Equipment maintenance repairman
36. Sod layer

VI. RENEWABLE NATURAL RESOURCES

Agricultural resources which are capable of reproducing or replenishing themselves are known as renewable natural resources. The occupations in this study are involved in the conservation and management of these resources for the economic and recreational benefit of mankind.

Forests: The principal activities include forest maintenance, reforestation, insect and disease control, and fire prevention.

Areas for investigation:

1. Value of forest
2. Tree identification
3. Forest establishment and management
4. Disease control
5. Insect and pest control
6. Fire prevention and suppression

Soil: The principal activities include offering information and services in water control, prevention of soil erosion, soil rehabilitation, land use, and land measurement.

Areas for investigation:

1. Soil identification
2. Land use classification
3. Soil conservation practices
4. Soil mapping and surveys
5. Soil fertility management

Wildlife: The principal activities include studying and providing information on migrations, habitats, and other characteristics of wildlife; developing methods of wildlife conservation; and propagating game for economic and recreational purposes.

Areas for investigation:

1. Identification and population management
2. Propagation
3. Census and habitat evaluation

Water: The principal activities include helping urban and rural land managers control, purify, transport, and conserve their water supply.

Areas for investigation:

1. Water sources
2. Determination of water quality and its control

Fish: The principal activities include breeding and stocking fish; regulating fish population in lakes, rivers, and ponds; and controlling disease.

Areas for investigation:

1. Pond construction and development for fish production
2. Fish pond management
3. Fish hatchery techniques
4. Stocking of lakes, rivers, and ponds
5. Breeding

Range: The principal activities include developing and protecting range lands for grazing, recreation, and wildlife by preventing overgrazing, erosion, and fire; controlling disease and poisonous plants; and maintaining roads, trails, water holes, and salt stations.

Areas for investigation:

1. Range plant ecology
2. Range plant identification
3. Range condition, trend, and utilization
4. Range grazing management
5. Range renovation practices

Recreational Uses: The principal activities include planning of campsites and recreational centers; participating in enforcement of recreational rules and regulations relating to parking, campfires, use of facilities, and sanitation to insure protection of picnic sites, campgrounds, and hunting and fishing areas; breeding and raising of game; and wildlife research.

Areas for investigation:

1. Identification of recreational use
2. Establishment, operation, and administration of a recreational enterprise
3. Protective agencies
4. Recreational rules and regulations
5. Wildlife research and propagation

The following occupations were developed into Teaching Modules for this guide:

Park Ranger Naturalist - Primary
Fish Culturist - Intermediate

The following occupations could be developed into Teaching Modules:

1. Conservation aide
2. Soil conservation technician
3. Forest ecologist
4. Forest geneologist
5. Forest inspector
6. Fire lookout man
7. Forest fire fighter
8. Forest sprayer
9. Surveyor
10. Mapper
11. Game animal breeder
12. Trapper or hunter
13. Natural history curator
14. Fish biologist
15. Taxidermist
16. Refuge manager
17. Game farm manager
18. Aquaculture technician
19. Marine quality control technician
20. Estuarine researcher
21. Fish hatchery manager
22. Seine man
23. Fishing instructor
24. Live bait dealer
25. Game protector
26. Range manager
27. Range conservationist
28. Park superintendent
29. Grounds maintenance technician
30. Animal keeper
31. Wildlife biologist
32. Wildlife technician
33. Game farm worker
34. Forest ranger
35. Agronomist

VII. FORESTRY

Forestry is the young and expanding profession of scientific management of forests, forest land, and their products in order to insure continuous production of goods and services. The occupations in this study are concerned with managing and utilizing timber resources; providing facilities for recreation; looking after grazing lands; developing homes for wildlife; safeguarding water supplies; reproducing, protecting, and improving forests; and researching methods of keeping the land productive.

Production and Propagation: The principal activities include planting, transplanting, cruising, and estimating timber; felling, limbing, and bucking trees; loading, transporting, and unloading logs; and dragging or skidding logs to a central loading area.

Areas for investigation:

1. Establishing a forest crop
2. Forest care and improvements
3. Measuring standing timber
4. Harvesting
5. Equipment

Protection: The principal activities include insect, fire, disease, erosion, and flood control; combating damage done by cattle and humans; and conducting research into methods of cutting and removing timber with minimum waste and damage.

Areas for investigation:

1. Protection from animals
2. Protection from fire
3. Protection from insects
4. Protection from disease
5. Ecological timber conservation
6. Development of cutting and removal techniques

Products and By-Products: The principal activities are concerned with putting wood into a more useful and convenient form. This includes separating and staking logs; cutting them into proper lengths, widths, and thicknesses; debarking, peeling, clipping, drying, gluing, cutting into sheets, sanding, grading, stamping, packing, and transporting to supply wholesalers and distributors; and gathering and/or collecting various by-products from the trees.

Areas for investigation:

1. Grading
2. Debarking
3. Sawing
4. Stacking

5. Drying
6. Seasoning
7. Equipment
8. Collection and processing of by-products

The following occupations were developed into Teaching Modules for this guide:

Forest Technician - Primary
Christmas Tree Farmer - Intermediate

The following occupations could be developed into Teaching Modules:

1. Logger
2. Timber stand improvement foreman
3. Logging operations inspector
4. Surveyor
5. Log contractor
6. Pulp buyer
7. Heavy equipment operator
8. Timber market estimator
9. Loader operator
10. Gang sawyer
11. Chipper operator
12. Skidway man
13. Chokerman
14. Forest fire control technician
15. Forest fireman
16. Tree surgeon
17. Entomologist
18. Forest ranger
19. Mill superintendent
20. Wood marketing foreman
21. Dry kiln foreman
22. Quality controller
23. Saw mill equipment operator
24. Grader
25. Debarker
26. Wood technologist
27. Gum gatherer
28. Sugar tapper
29. Sap collector
30. Greenspicker
31. Moss cutter
32. Resin gatherer

VIII. ENVIRONMENTAL PROTECTION

Occupations in this area are involved in the protection of water, air, and soil, all of which are essential to man's survival, and the elimination or control of man-made elements which are harmful to man and to the environment.

Water: The principal activities deal with engineering ground water systems, sewage systems, water purification plants, and waste water treatment plants; studying the sources and effects of all water pollution; and developing new methods of cleaning polluted water and desalinating sea water.

Areas for investigation:

1. Sources and uses of water
2. Quality of water
3. Purpose of chemicals
4. Sedimentation
5. Filtration
6. Softening
7. Aeration
8. Storage and distribution
9. Recycling of water
10. Bacteriology
11. Equipment

Air, Noise, Radiation: The principal activities deal with studying the effects of radiation on man, animals, and plants; isolating dangerous quantities of radioactive waste from nuclear power plants; reducing the amount of pollution produced from the internal combustion engine or the burning of industrial fuels; investigating the effects of airborne fibers insulating buildings; and reducing the sound produced by mechanical devices.

Areas for investigation:

1. Sampling methods
2. Equipment
3. Analyzing data
4. Complaint investigations
5. Health hazards
6. Effective controls

Solid Wastes: The principal activities deal with planning and operating incinerators, land fills, and other disposal processes; regulating garbage pick-up and handling; inventing new biodegradable products for manufacturers; and aiding farmers in disposing of livestock waste.

Areas for investigation:

1. Landfill operations
2. Incinerator operations
3. Collection systems
4. Biodegradable products
5. Agricultural wastes

The following occupations were developed into Teaching Modules for this guide:

Environmental Inspector - Primary
Environmental Technician (noise) - Intermediate

The following occupations could be developed into Teaching Modules:

1. Estuarine oceanographer
2. Ground water hydrologist
3. Watershed foreman
4. Aquatic biologist
5. Water treatment plant superintendent
6. Water treatment plant chemist
7. Water treatment plant laboratory technician
8. Limnologist
9. Biochemist
10. Biophysicist
11. Microbiologist
12. Zoologist
13. Botanist
14. Analytical chemist
15. Inorganic chemist
16. Organic chemist
17. Civil engineer chemist
18. Waste water treatment plant superintendent
19. Operations supervisor
20. Waste water technician
21. Radiological health technician (monitor)
22. Radiological pollution control technician
23. Air pollution control director
24. Air pollution control engineer
25. Air pollution control meteorologist
26. Incinerator foreman
27. Incinerator operator
28. Combustion engineer
29. Air analyst
30. Climatologist
31. Power plant operator
32. Nuclear engineer
33. Industrial engineer
34. Sanitary engineer
35. Sanitarian
36. Refuse collector
37. Solid waste disposal operator

APPENDIX B

CAREER DEVELOPMENT CONCEPTS

DEVELOPMENTAL DIMENSIONS

The four components (Coping Behavior, Self-Development, Decision Making, Lifestyle) in which concepts can be sequenced in a logical progression for different experience levels.

INTERACTING DIMENSIONS

The five components of career development (attitudes and appreciations, career information, educational awareness, skill awareness, economic awareness) in which all concepts are appropriate for all experience levels.

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MAJOR CONCEPTS AND SUBCONCEPTS ORGANIZED BY DIMENSION

DEVELOPMENTAL DIMENSIONS

COPING BEHAVIORS

1. Major Concept

Certain identifiable attitudes, values, and behaviors enable one to obtain, hold, and advance in a career.

Readiness Level

An individual should learn to cope with authority exercised by others.

First Experience Level

An individual should learn to cope with the rights and feelings of others.

Second Experience Level

An individual should learn how to give and take criticism.

Third Experience Level

A contribution to group effort can be made by demonstrating ability to both compromise and exercise influence in achievement of group goals.

Fourth Experience Level

Certain behaviors are appropriate to specific job settings.

Fifth Experience Level

There is a universality of feelings and aspirations of all people regardless of physical appearance, nationality, creed, sex, or ethnic background.

Sixth Experience Level

There are effective interpersonal relations skills for giving or evaluating instructions.

2. Major Concept

Individuals can learn to perform adequately in a variety of occupations and occupational environments.

Readiness Level

Different skills are required for different tasks.

First Experience Level

Several skills may be required to perform a given task.

Second Experience Level

Some skills can be transferred from one job to another.

Third Experience Level

Performance requirements for a job will vary with the work setting of the job.

Fourth Experience Level

Performance requirements for a job may change with time.

Fifth Experience Level

It is important for a person to be able to make the transition from one job to another.

Sixth Experience Level

There are characteristics which differentiate between occupations--both within and between job families.

SELF DEVELOPMENT

1. Major Concept

An understanding and acceptance of self is important.

Readiness Level

Awareness of oneself within the context of the family structure is important.

First Experience Level

An individual experiences various roles--friend, student, group member, etc.

Second Experience Level

There are certain physical, social, and emotional characteristics which make an individual unique.

Third Experience Level

An individual's feelings relative to happiness, fear, anger, loneliness, etc., are diverse.

Fourth Experience Level

A person's membership in a group affects the group as well as himself.

Fifth Experience Level

Interests and abilities mature and change as well as one's physical being.

Sixth Experience Level

There is a relationship between an individual's knowledge and acceptance of self and his career preference.

2. Major Concept

Social, economic, educational, and cultural forces influence self-development.

Readiness Level

An individual is influenced by other people.

First Experience Level

The school can provide an opportunity to enhance self-development.

Second Experience Level

An individual's feelings and the feelings of others relate to commonly held beliefs and customs.

Third Experience Level

Groups outside of school influence an individual's personal development.

Fourth Experience Level

An individual is influenced by economic forces.

Fifth Experience Level

Changes in an individual influence his environment and changes in environment influence him.

Sixth Experience Level

An individual's values and personal goals are influenced by the values of other people.

3. Major Concept

Individuals differ in their interests, aptitudes, values, and achievements.

Readiness Level

An individual should be aware of the tasks that he performs and begin to determine his interests in these tasks.

First Experience Level

An individual's interests, aptitudes, values, and achievements are not always the same as those of his peers.

Second Experience Level

An individual has social, physical, and intellectual aptitudes for various tasks.

Third Experience Level

Individuals differ in their physical characteristics.

Fourth Experience Level

Achievements in school and out of school are often dependent upon interests, aptitudes, and values.

Fifth Experience Level

An individual can differentiate between himself and others in terms of interests, aptitudes, values, and achievements in and out of school.

Sixth Experience Level

There is a relationship among interests, aptitudes, achievements, values, and occupations.

DECISION MAKING

1. Major Concept

Life involves a series of choices leading to career commitments.

Readiness Level

Choice means "making up one's mind" and there are certain situations where one can make choices.

First Experience Level

Things change and these changes influence the choices and decisions one makes.

Second Experience Level

An individual's decisions affect himself and others.

Third Experience Level

People change and these changes influence the choices and decisions one makes.

Fourth Experience Level

Decision making involves risks.

Fifth Experience Level

Decision making can precipitate chain reactions.

Sixth Experience Level

Previous decisions, peers, gratifications, needs, interests, and career information influence present and future decisions.

2. Major Concept

Basic components of the decision-making process can be applied to the establishing of personal goals and the making of career-related decisions.

Readiness Level

An individual should recognize what "a goal" is and learn how to set one's own goals.

First Experience Level

Problems which conflict with one's goals can be identified and assessed.

Second Experience Level

An individual should consider alternative ways to reach a given goal.

Third Experience Level

Decision making plays a role in the setting of immediate and long-range goals.

Fourth Experience Level

The decision-making process can be used to set priorities in developing personal goals.

Fifth Experience Level

Setting goals can be enhanced by analyzing decision-making processes.

Sixth Experience Level

The decision-making process can be used to determine one's preferences, at that point in time, between various job families.

LIFESTYLE

1. Major Concept

Work affects an individual's way of life in that a person is a social being, an economic being, a family being, a leisure being, and a moral being.

Readiness Level

Most people work and there are many reasons why people work.

First Experience Level

Family members perform work they are capable of performing, responsibilities are shared, and the family is an interdependent unit.

Second Experience Level

Lifestyles within a community differ.

Third Experience Level

Relationships exist between a person's occupation and the people with whom a person tends to associate.

Fourth Experience Level

Moral principles are an integral part of one's work life.

Fifth Experience Level

Relationships exist between desired lifestyles and career monetary rewards.

Sixth Experience Level

Leisure-time activities and interests may lead to a career, and one's career may, in turn, effect the amount and use of leisure time.

ATTITUDES AND APPRECIATIONS

1. Major Concept

Society is dependent upon the productive work of individuals.

Subconcepts

Completion of a worthwhile task has value for the worker and for society.

Work involves the acceptance of responsibility for a task.

A great many tasks can be performed by men or women.

Most occupations include common expectations, such as punctuality, dependability, and avoidance of excessive absence.

A given work setting requires certain policies and procedures.

Specialized occupations result in an interdependent society.

CAREER INFORMATION

1. Major Concept

Basic career information will aid in making career-related decisions.

Subconcepts

Occupations may have certain dress requirements.

Occupations require the use of specific materials and equipment.

Occupations have their own vocabularies.

The individual worker determines which aspects of an occupation may be unpleasant or pleasant.

Occupations have their own work settings.

Occupations require special personal characteristics.

Earnings vary with occupations.

Career development includes progression through stages of educational and occupational training.

Costs of training for occupations vary.

Technological, economic, social, and political factors influence supply and demand of jobs.

EDUCATIONAL AWARENESS

1. Major Concept

Educational skills and experiences are related to the achievement of career goals.

Subconcepts

Skills and knowledges in subject areas are helpful in occupational competence.

Career-oriented learning may take place in or out of school.

Learning is a lifelong process.

Learning achievement depends upon effort and ability.

SKILL AWARENESS

1. Major Concept

All occupations require general and specific skills.

Subconcepts

Some skills are common to many career areas.

Some occupations require skills using particular tools.

Most occupations require skills and knowledge in communications, mathematics, organization, and/or problem solving.

Most occupations require a beginning skill competency.

All workers require skills to search for, locate, and obtain career placement on an initial basis and for advancement.

Career plans should be designed and executed with the understanding that evaluation and replanning may be necessary.

ECONOMIC AWARENESS

2. Major Concept

Basic economic understanding aids in making career-related decisions.

Subconcepts

Individual economic needs and wants differ.

Earnings vary among and within occupations.

Additional training and experience increases earning potential.

Obligations for fair pay and work are implied between employee and employer.

Economic trends can influence a career choice.

Work is a means of gaining societal rewards.

Developed By
Career Development
Curriculum Project
Eastern Illinois University
Charleston, Illinois 61920

APPENDIX C

SUBJECT MATTER

LANGUAGE ARTS

Biographies
Brainstorming
Bulletin boards
Business telephone manners
Charts
Comparisons
Completion of sentences
Creative writing
Debate
Dictionary skills
Discussion
Editing a pamphlet
Interviewing
Letter writing
Narration
Panel discussions
Plays
Presentations -- speeches
Public speaking
Puzzles
Reading current articles
Reporting
Report writing
Research skills
Role playing
Vocabulary skills

MATHEMATICS

Adding machines
Addition
Area
Averages
Cash register
Comparison of prices
Computation
Computing cost
Decimal system
Estimates
Fractions
Graphs
Measurements
Metric system of measurement
Percents
Profit-loss statements
Recording of mathematical data
Scale drawings
Statistics
Tallies
Time

SCIENCE

Animal and plant nutrition
Animal genetics and heredity
Animal structure
Changes in matter and energy
Chemicals
Chemical reactions
Classifications
Comparisons
Conservation
Diagrams
Earth cycles -- water cycles, sedimentation
Ecosystems and ecology
Electricity and magnetism
Electronics
Energy transformation
Environmental protection
Experiments
Field trips
How objects move; motion and direction
Insect classification
Making comparisons
Observations
Organic compounds
Pasteurizing
Photosynthesis
Plant and animal diseases
Plant genetics
Plant identification
Preservation of food
Problem solving
Research
Scale drawings
Scientific methods
Scientific nomenclature
Seed identification
Simple machines and machinery
Soil testing
Water purification and transportation systems

SOCIAL STUDIES

American history
City growth and planning
Current events
Economics
Environmental control and ecology
Geography
History's affect on present day
Land forms
Map skills
Manufacturing
Natural resources' affect on economy
Problem solving
Sociology (interdependent society)
Transportation

APPENDIX D

SUBJECT MATTER ARTICULATION

SUBJECT MATTER COURSES

IN WHICH LEARNING MODULES COULD BE TAUGHT

SOCIAL STUDIES

Agricultural Production
Agricultural Equipment and Mechanics
Agricultural Products (Food Processing)
Renewable Natural Resources
Forestry
Environmental Protection

SCIENCE

All Modules

MATHEMATICS

Agricultural Production
Agricultural Equipment and Mechanics
Forestry
Environmental Protection

LANGUAGE ARTS

Agricultural Supplies and Services
Ornamental Horticulture
Environmental Protection

HOME ECONOMICS

Agricultural Products (Food Processing)

INDUSTRIAL ARTS

Agricultural Equipment and Mechanics
Forestry

ART

Ornamental Horticulture

AGRICULTURE

All Modules

CAREER EXPLORATION

All Modules

K-6 CAREER DEVELOPMENT INFUSED MODULES

CAREER DEVELOPMENT CONCEPTS	PRIMARY GRADE LEVEL				INTERMEDIATE GRADE LEVEL		
	K	1	2	3	4	5	6
COPING BEHAVIOR #1				FOREST TECHNICIAN			FEED SALES PERSONNEL
COPING BEHAVIOR #2		PARK RANGER NATURALIST			CHRISTMAS TREE FARMER		
LIFESTYLE	PEANUT BUTTER MAKER					IRRIGATION ENGINEER	
SELF-DEVELOPMENT #1	ENVIRONMENTAL INSPECTOR				ENVIRONMENTAL TECHNICIAN (noise)		
SELF-DEVELOPMENT #2		AGRONOMIST					DAIRY PROCESSING EQUIPMENT OPERATOR (cheese)
SELF-DEVELOPMENT #3				FARM EQUIPMENT MECHANIC			FISH CULTURIST
DECISION MAKING #1			FLORIST			LIVESTOCK PRODUCER	
DECISION MAKING #2			TRUCK FARMER			GREENSKEEPER	

I. Agricultural Production
    A. Truck Farmer
    B. Livestock Producer

II. Agricultural Supplies and Services
    A. Agronomist
    B. Feed Sales Personnel

III. Agricultural Equipment and Mechanics
    A. Farm Equipment Mechanic
    B. Irrigation Engineer

IV. Agricultural Products (Food Processing)
    A. Peanut Butter Maker
    B. Dairy Processing Equipment Operator (cheese)

V. Ornamental Horticulture
    A. Florist
    B. Greenskeeper

VI. Renewable Natural Resources
    A. Park Ranger Naturalist
    B. Fish Culturist

VII. Forestry
    A. Forest Technician
    B. Christmas Tree Farmer

VIII. Environmental Protection
    A. Environmental Inspector
    B. Environmental Technician (noise)

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PILOT TESTING SCHOOLS

JUNIOR HIGH 7-9

Casey Junior-Senior High School, Casey, Illinois
Central Junior High School, Steger, Illinois
Cumberland Elementary and Junior High School, Greenup, Illinois
East Park Junior High School, Danville, Illinois
Sullivan Junior High School, Sullivan, Illinois
Venice Middle School, Venice, Illinois
Washington Junior High School, Carmi, Illinois

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